
REPORT No. 182

AERODYNAMIC CHARACTERISTICS OF AIRFOILS—III

CONTINUATION OF REPORTS Nos. 93 AND 124

BY

**NATIONAL ADVISORY COMMITTEE
FOR AERONAUTICS**

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AERODYNAMIC CHARACTERISTICS OF AIRFOILS—III.

CONTINUATION OF REPORTS NOS. 93 AND 124.

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INTRODUCTION.

This collection of data on airfoils has been made from the published reports of a number of the leading aerodynamic laboratories of this country and Europe.¹ The information which was originally expressed according to the different customs of the several laboratories is here presented in a uniform series of charts and tables suitable for the use of designing engineers and for purposes of general reference.

It is a well-known fact that the results obtained in different laboratories, because of their individual methods of testing, are not strictly comparable even if proper scale corrections for size of model and speed of test are supplied. It is, therefore, unwise to compare too closely the coefficients of two wing sections tested in different laboratories. Tests of different wing sections from the same source, however, may be relied on to give true relative values.

The absolute system of coefficients has been used, since it is thought by the National Advisory Committee for Aeronautics that this system is the one most suited for international use and yet is one for which a desired transformation can be easily made. For this purpose a set of transformation constants is included in this report.

Each airfoil section is given a reference number, and the test data are presented in the form of curves from which the coefficients can be read with sufficient accuracy for designing purposes. The dimensions of the profile of each section are given at various stations along the chord in per cent of the chord, the latter also serving as the datum line. When two sets of ordinates are necessary, on account of taper in chord or ordinate, those for the maximum section (at center of span) are given on the individual characteristic sheets, while those for the tip (dotted) section are given in separate tables. Where the ratio of ordinate to chord remains constant the one set of ordinates applies to both center and tip section. The shape of the section is also shown with reasonable accuracy to enable one to more clearly visualize the section under consideration, together with its characteristics.

The authority for the results here presented is given as the name of the laboratory at which the experiments were conducted, with the size of model, wind velocity, and year of test.

TRANSFORMATION CONSTANTS.

For the convenience of those who prefer to use a system of units other than the absolute system, there is given below a table of transformation constants based on the standard condition adopted by the National Advisory Committee for Aeronautics of—

Temperature = 15.6° C.

Pressure = 760 mm Hg.

Humidity = 0.

Gravity = 9.806 m/sec² = 32.172 ft/sec.²

thus giving values of specific weight of air

$$W = 1.223 \text{ kg/m}^3 = 0.07635 \text{ lb/ft.}^3$$

and of density

$$\rho = 0.1247 \text{ in the French engineering or kilogram, meter, second system.}$$

Or

$$= 0.00237 \text{ in the English or pound, foot, second system.}$$

¹ A previous collection of airfoil sections 1 to 375 and charts 1 to 9 may be found in N. A. C. A. Reports Nos. 93 and 124.

In absolute units.....	$P = CV^2 \rho / 2.$
In kg/m ² (m/sec).....	$P = .0625 CV^2.$
In kg/m ² (km/hr).....	$P = .004822 CV^2.$
In lb/sq ft (ft/sec).....	$P = .001189 CV^2.$
In lb/sq ft (mi/hr).....	$P = .002558 CV^2.$

(Note that these constants are half as large as those used in Reports Nos. 93 and 124 and that the absolute coefficients used in this report are twice as large as the old coefficients. See Report 157 regarding change in absolute coefficients.)

INDEX.

Three separate types of index are given—chart indexes which make it possible for a designer to select the wing section most suitable for the particular design in which he is interested; a group index which is arranged by countries and laboratories at which tests were conducted, each section also being designated by a reference number; and an alphabetical index.

CHART INDEX.

In order that the designer may easily pick out a wing section which is suited to the type of airplane on which he is working, four index charts are given which classify the wings according to their aerodynamic and structural properties. In the charts of this report a lower-case letter is placed adjacent to the reference number giving VL values, so that a comparison can be made without referring to the individual drawings.

In chart No. 9 the minimum drag C_D is plotted against the L/D at one-fourth the maximum lift C_L . This chart should be used in choosing a wing section for a high-speed airplane, the wing sections being more suited for this use the farther they are from the lower left-hand corner.

In chart No. 10 the mean spar depth is plotted against the maximum lift C_L in order to show the possible strength and lightness of the wing structure. The higher the maximum lift coefficient is the smaller will be the wing area and the lighter the structural weight, and in the same way the greater the depth of the spars the lighter will be their weight, so that the sections the greatest distance from the lower left-hand corner will give the lightest and strongest wings. The "mean spar depth" is obtained by assuming the spars to be located respectively at 15 and 60 per cent of the chord, and by dividing the sum of their thicknesses by 2. In the case of sections tapered in ordinate, or chord, or both, the mean spar depth of the maximum section (section at center of span) is taken in per cent of the constant chord for the ordinate taper, and of the mean chord for the chord taper although accompanied, in certain airfoils, with an ordinate taper.

In chart No. 11 the maximum L/D is plotted against the maximum lift C_L , which is of use in choosing the wing section for a slow and efficient airplane. In the same way as before, the sections farthest from the lower left-hand corner are the best for this purpose.

In chart No. 12 the L/D at two-thirds the maximum lift C_L is plotted against the maximum lift C_L . This chart can be used for choosing a section that will give an efficient climb or a long range at cruising speed. The best sections for this purpose will be the farthest from the lower left-hand corner of the chart.

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GROUP INDEX.

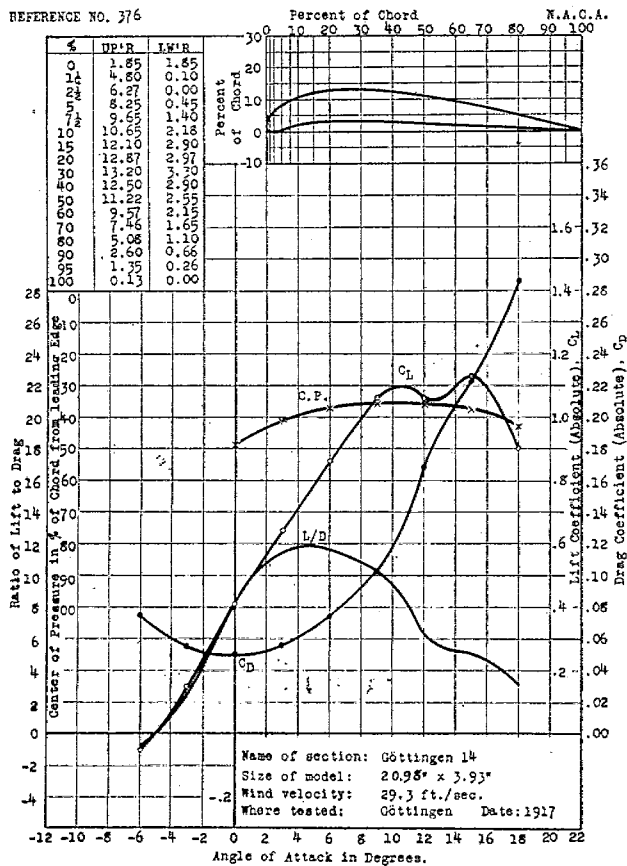
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N. A. C. A. 55.....	do.	432	Eiffel 376	do.	497
N. A. C. A. 56.....	do.	433	Eiffel 377	do.	498
N. A. C. A. 57.....	do.	434	Eiffel 378	do.	499
N. A. C. A. 58.....	do.	435	Eiffel 380	do.	500
N. A. C. A. 59.....	do.	436	Eiffel 385 (S. I. Ac.)	do.	501
N. A. C. A. 60.....	do.	437	Eiffel 394 (Eiffel 102)	do.	502
N. A. C. A. 61.....	do.	438	St. Cyr 52 (Caudron)	do.	503
N. A. C. A. 62.....	do.	439	GERMANY.		
N. A. C. A. 64.....	do.	440	14.....	Göttingen	376
N. A. C. A. 65.....	do.	441	15.....	do.	377
N. A. C. A. 66.....	do.	442	29b.....	do.	378
N. A. C. A. 68.....	do.	443	54.....	do.	379
N. A. C. A. 69.....	do.	444	55.....	do.	380
N. A. C. A. 71.....	do.	445	57.....	do.	381
N. A. C. A. 73.....	do.	446	63.....	do.	382
N. A. C. A. 77.....	do.	447	81.....	do.	383
N. A. C. A. 79.....	do.	448	92.....	do.	384
N. A. C. A. 81.....	do.	449	100 (Flz. Sopwith)	do.	385
U. S. A. 27 with ordinates increased 20 per cent.	M. I. T.	450	114 (M. V. A. Mk. 1)	do.	386
U. S. A. 27a.....	do.	451	115 (M. V. A. Mk. 2)	do.	387
U. S. A. 27b.....	do.	452	116 (M. V. A. Mk. 3)	do.	388
U. S. A. 27c.....	do.	453	117 (M. V. A. Mk. 4)	do.	389
U. S. A. 27c (modified)	do.	454	118 (M. V. A. Mk. 7)	do.	390
U. S. A. 35A.....	do.	486	119 (M. V. A. Mk. 8)	do.	391
U. S. A. 35B.....	do.	487	121 (II. 1)	do.	392
Curtiss C-32.....	do.	455	122 (II. 2)	do.	393
Aeromarine 2.....	do.	456	124 (II. 4)	do.	394
Aeromarine 6.....	do.	457	133 (M. V. A. H. 11)	do.	395
L. W. F.....	do.	458	134 (M. V. A. H. 12)	do.	396
Martin M-VI.....	W. N. Y.	459	137 (M. V. A. H. 15)	do.	397
H-1.....	M. I. T.	460	140 (M. V. A. H. 17)	do.	398
H-3a.....	do.	461	143 (M. V. A. H. 20)	do.	399
H-3b.....	do.	462	144 (M. V. A. H. 21)	do.	400
D-1.....	do.	463	155 (S. S. W. D. 1)	do.	401
Hall 4.....	W. N. Y.	464	167 (v. Kármán Prop)	do.	402
Hall 5.....	do.	465	178 (M. V. A. H. 24)	do.	403
Dormoy.....	M. I. T.	466	180 (M. V. A. H. 26)	do.	404
Durand 3.....	L. M. A. L.	480	182 (M. V. A. H. 27)	do.	405
Durand 21.....	do.	481	187 (Schütte-Lanz 2u)	do.	406
Durand 22.....	do.	482	1o).		
Durand 23.....	do.	483	Göttingen 188 (Schütte-Lanz 3u)	do.	407
Durand 24.....	do.	484	1o).		
Durand 25.....	do.	485	190 (M. V. A. Mk. 18)	do.	408
GREAT BRITAIN. ¹			198 (L. F. G. 5294)	do.	409
B. I. R. 30.....	E. L. C.	472	199 (L. F. G. 5406)	do.	410
B. I. R. 30a.....	do.	473	206 (Aviatik V7)	do.	411
B. I. R. 31.....	do.	474	207 (Aviatik V8)	do.	412
B. I. R. 31a.....	do.	475	210 (Daimler)	do.	413
B. I. R. 32.....	do.	476	233 (M. V. A. Ca4)	do.	414
B. I. R. 32a.....	do.	477	Göteborg 235 (Schütte-Lanz)	do.	415
B. I. R. 34.....	do.	478	Göteborg 238 (Hansa-Brandenburg)	do.	416
B. I. R. 34a.....	do.	479	1o).		
FRANCE.			Göteborg 240 (Koller)	do.	417
Eiffel 8a.....	Eiffel	467	Göteborg 257 (Flz. Ago. CIV)	do.	418
Eiffel 8b.....	do.	468	Göteborg 261 (Daimler 97 ¹¹)	do.	419
Eiffel 77.....	do.	469	Göteborg 264 (Flz. Fréhen 53, R1)	do.	420
Eiffel 318 (Herbemont)	do.	488	269 (Flz. Rumpler)	do.	421
Eiffel 322 (P. Magni X)	do.	470	(Daimler VIII)	do.	422
Eiffel 323 (P. Magni XII)	do.	471	(Daimler IX)	do.	423
Eiffel 336 (Monge)	do.	489		do.	424
Eiffel 341 (Monge)	do.	490		do.	425
Eiffel 366 (Monge)	do.	491	(M. V. A. H. 43)	do.	426
Eiffel 367 (Monge)	do.	492	(Hansa-Brandenburg)	do.	427
Eiffel 368 (Monge)	do.	493		do.	428
Eiffel 371 (Monge)	do.	494		do.	429
Eiffel 372 (Monge)	do.	495		do.	430

¹ B. I. R. 33a of this group published in Report No. 93.

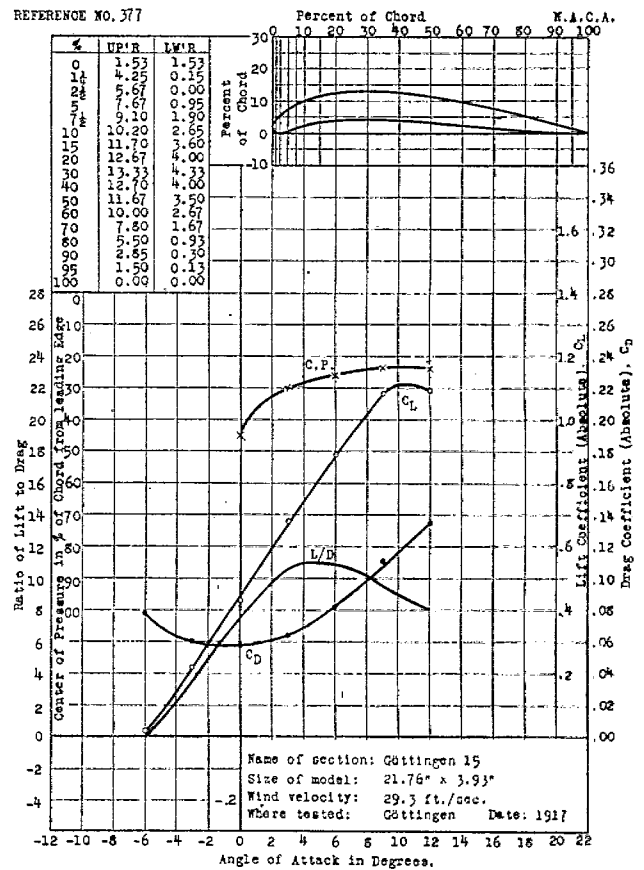
ALPHABETICAL INDEX.

Airfoil.	Report reference number.	Airfoil.	Report reference number.
Aeromarine 2.....	456	Göttingen 155 (S. S. W. D. 1).....	401
Aeromarine 6.....	457	Göttingen 167 (v. Kärman Prop. 2).....	402
B. I. R. 30.....	472	Göttingen 178 (M. V. A. H. 24).....	403
B. I. R. 30a.....	473	Göttingen 180 (M. V. A. H. 26).....	404
B. I. R. 31.....	474	Göttingen 182 (M. V. A. H. 27).....	405
B. I. R. 31a.....	475	Göttingen 187 (Schütte-Lanz 2u 1o).....	406
B. I. R. 32.....	476	Göttingen 188 (Schütte-Lanz 3u 1o).....	407
B. I. R. 32a.....	477	Göttingen 190 (M. V. A. Mk. 18).....	408
B. I. R. 34.....	478	Göttingen 198 (L. F. G. 5294).....	409
B. I. R. 34a.....	479	Göttingen 199 (L. F. G. 5406).....	410
Curtiss C-32.....	455	Göttingen 206 (Aviatik V7).....	411
D-1.....	463	Göttingen 207 (Aviatik V8).....	412
Dornoy.....	466	Göttingen 210 (Daimler).....	413
Durand 3.....	480	Göttingen 233 (M. V. A. Ca4).....	414
Durand 21.....	481	Göttingen 255 (Schütte-Lanz).....	415
Durand 22.....	482	Göttingen 238 (Hansa-Brandenburg).....	416
Durand 23.....	483	Göttingen 240 (Koller).....	417
Durand 24.....	484	Göttingen 257 (Flz. Ago. CIV).....	418
Durand 25.....	485	Göttingen 261 (Daimler 97 ^{II}).....	419
Eiffel 8a.....	467	Göttingen 264 (Flz. Fr'hafen 53, R1).....	420
Eiffel 8b.....	468	Göttingen 269 (Flz. Rumpler CIV).....	421
Eiffel 77.....	469	Göttingen 277 (Daimler VIII).....	422
Eiffel 318 (Herbemont).....	488	Göttingen 278 (Daimler IX).....	423
Eiffel 322 (P. Magni X).....	470	Göttingen 286.....	424
Eiffel 323 (P. Magni XII).....	471	Göttingen 287.....	425
Eiffel 336 (Monge).....	489	Göttingen 311 (M. V. A. H. 43).....	426
Eiffel 341 (Monge).....	490	Göttingen 317 (Hansa-Brandenburg V5).....	427
Eiffel 366 (Monge).....	491	Göttingen 376.....	428
Eiffel 367 (Monge).....	492	Göttingen 457.....	429
Eiffel 368 (Monge).....	493	Göttingen 461.....	430
Eiffel 371 (Monge).....	494	H-1.....	460
Eiffel 372 (Monge).....	495	H-3a.....	461
Eiffel 375 (Monge).....	496	H-3b.....	462
Eiffel 376 (Monge).....	497	Hall 4.....	464
Eiffel 377 (Monge).....	498	Hall 5.....	465
Eiffel 379 (Monge).....	499	L. W. F.....	458
Eiffel 380 (Monge).....	500	Martin M-VI.....	459
Eiffel 385 (S. T. Aë.).....	501	N. A. C. A. 54.....	431
Eiffel 394 (Eiffel 102).....	502	N. A. C. A. 55.....	432
Göttingen 14.....	376	N. A. C. A. 56.....	433
Göttingen 15.....	377	N. A. C. A. 57.....	434
Göttingen 29b.....	378	N. A. C. A. 58.....	435
Göttingen 54.....	379	N. A. C. A. 59.....	436
Göttingen 55.....	380	N. A. C. A. 60.....	437
Göttingen 57.....	381	N. A. C. A. 61.....	438
Göttingen 63.....	382	N. A. C. A. 62.....	439
Göttingen 81.....	383	N. A. C. A. 64.....	440
Göttingen 92.....	384	N. A. C. A. 65.....	441
Göttingen 100 (Flz. Sopwith).....	385	N. A. C. A. 66.....	442
Göttingen 114 (M. V. A. Mk. 1).....	386	N. A. C. A. 68.....	443
Göttingen 115 (M. V. A. Mk. 2).....	387	N. A. C. A. 69.....	444
Göttingen 116 (M. V. A. Mk. 3).....	388	N. A. C. A. 71.....	445
Göttingen 117 (M. V. A. Mk. 4).....	389	N. A. C. A. 73.....	446
Göttingen 118 (M. V. A. Mk. 7).....	390	N. A. C. A. 77.....	447
Göttingen 119 (M. V. A. Mk. 8).....	391	N. A. C. A. 79.....	448
Göttingen 121 (H. 1).....	392	N. A. C. A. 81.....	449
Göttingen 122 (H. 2).....	393	St. Cyr 52 (Caudron).....	503
Göttingen 124 (H. 4).....	394	U. S. A. 27 with ordinates increased 20 per cent.....	450
Göttingen 133 (M. V. A. H. 11).....	395	U. S. A. 27a.....	451
Göttingen 134 (M. V. A. H. 12).....	396	U. S. A. 27b.....	452
Göttingen 137 (M. V. A. H. 15).....	397	U. S. A. 27c.....	453
Göttingen 140 (M. V. A. H. 17).....	398	U. S. A. 27c (modified).....	454
Göttingen 143 (M. V. A. H. 23).....	399	U. S. A. 35A.....	486
Göttingen 144 (M. V. A. H. 21).....	400	U. S. A. 35B.....	487

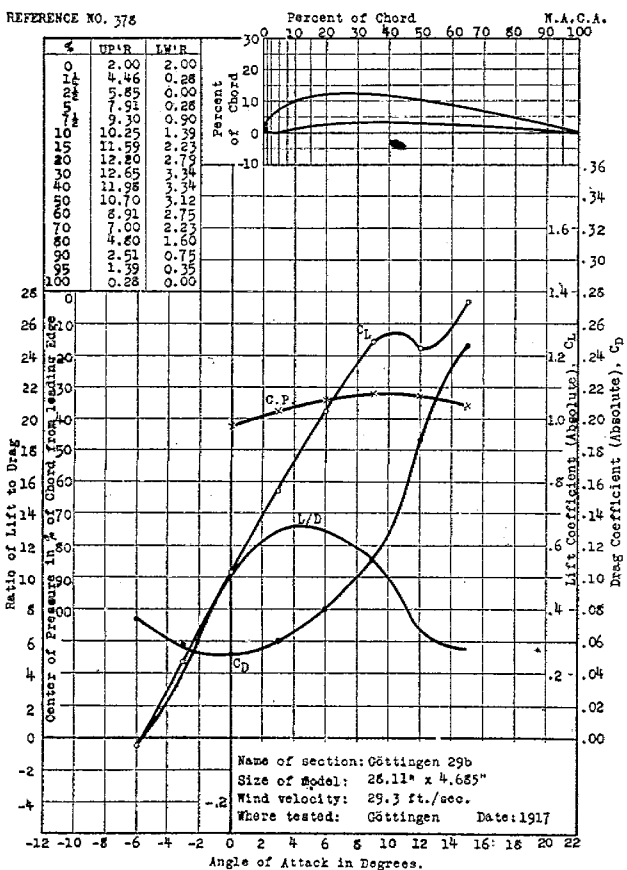
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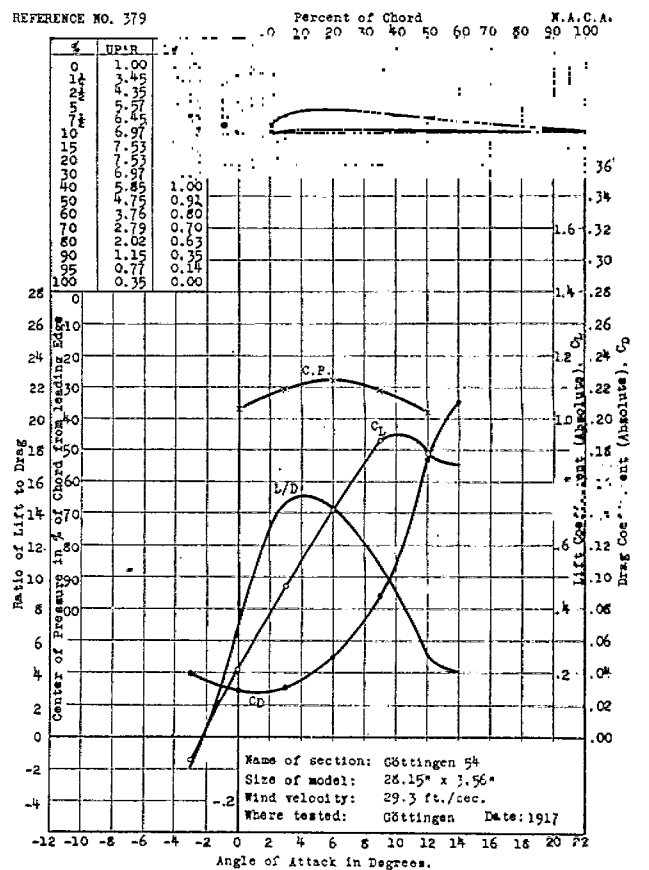
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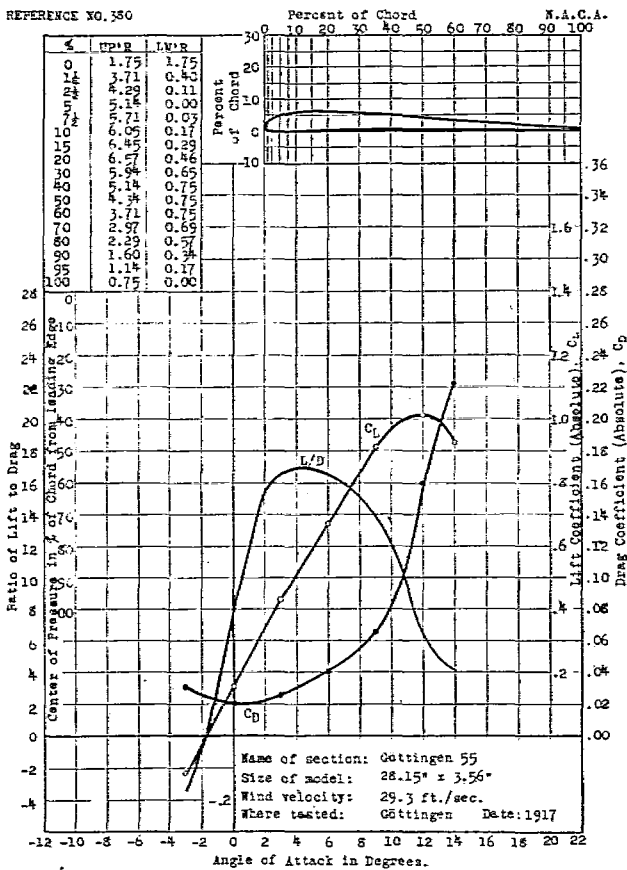
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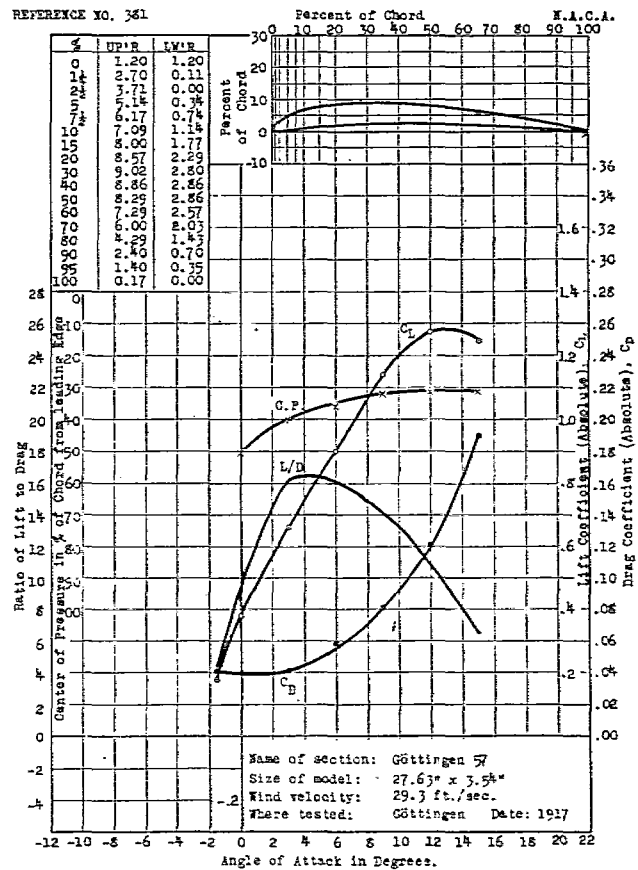
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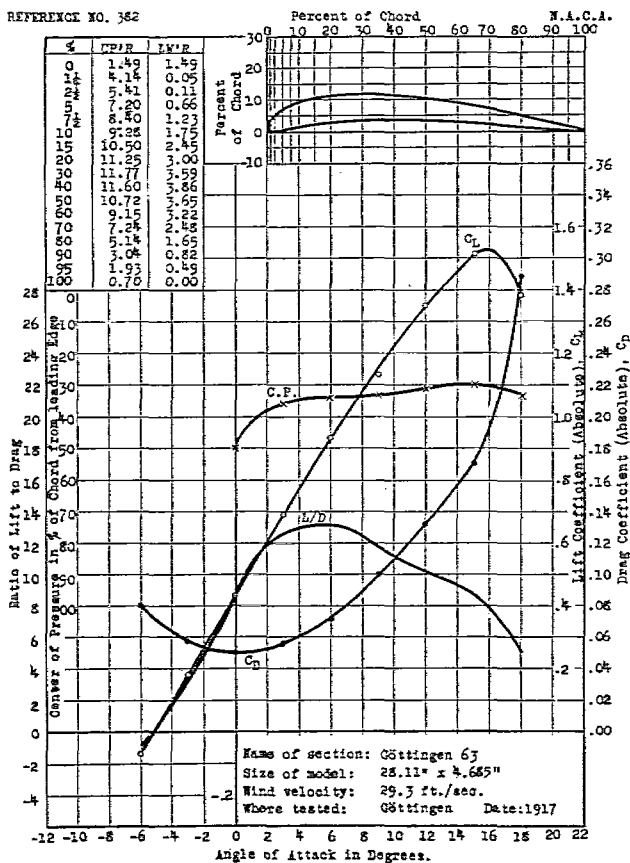
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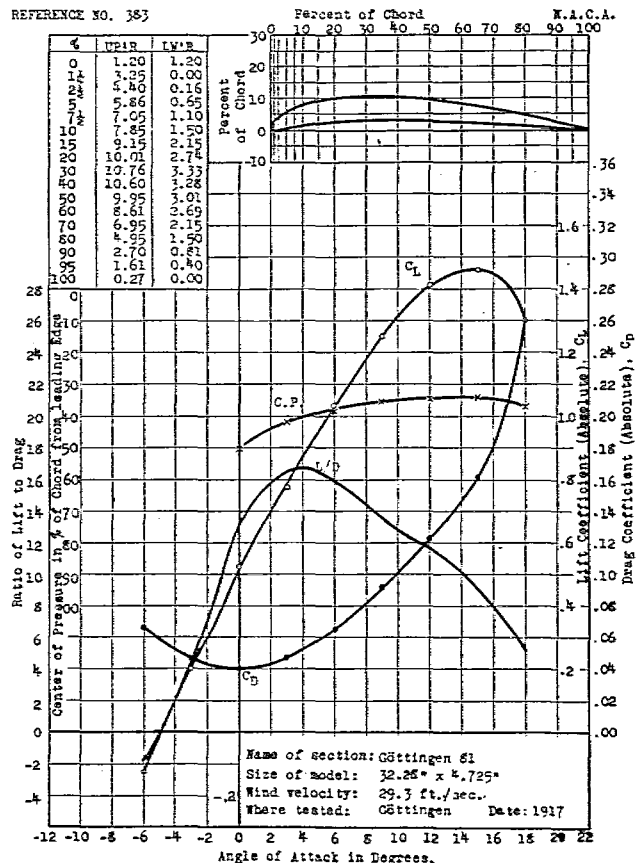
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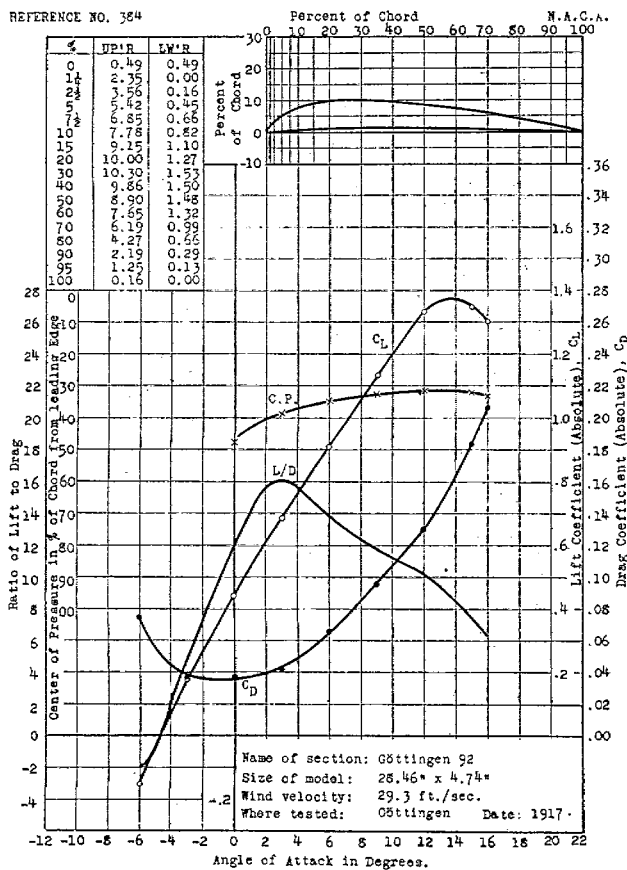
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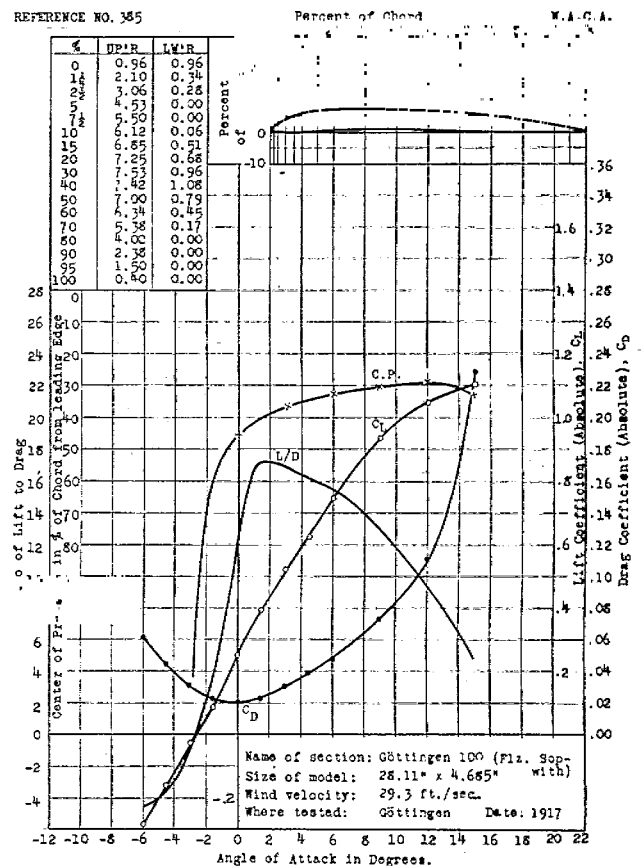
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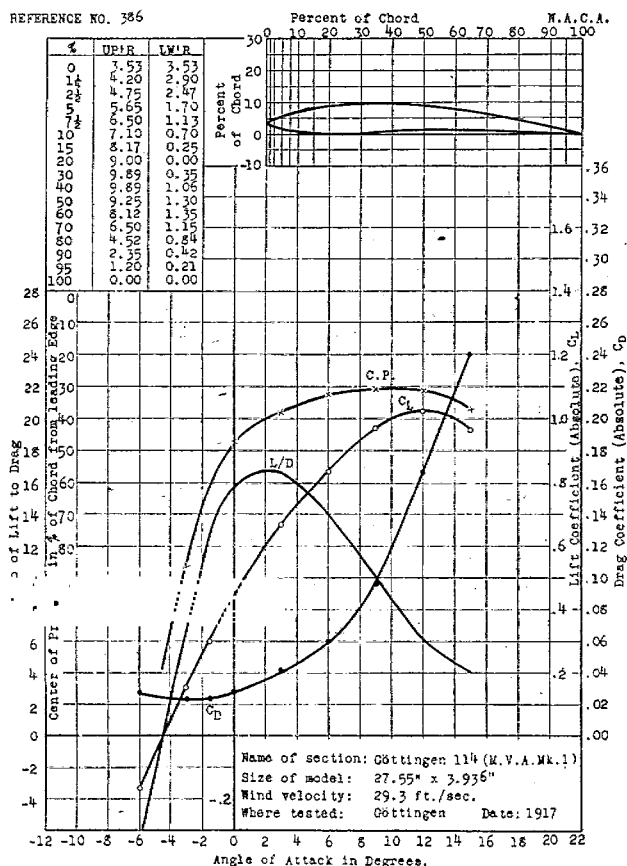
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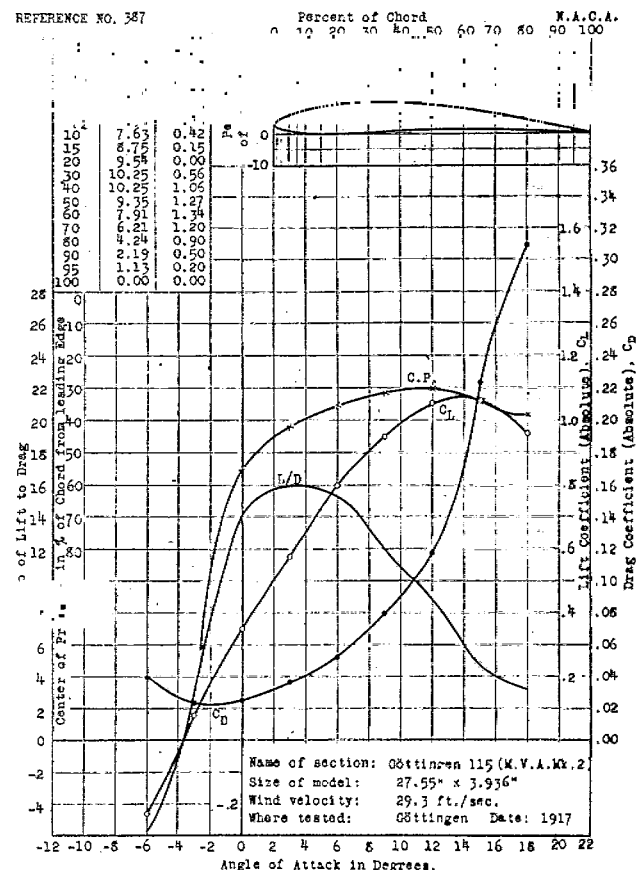
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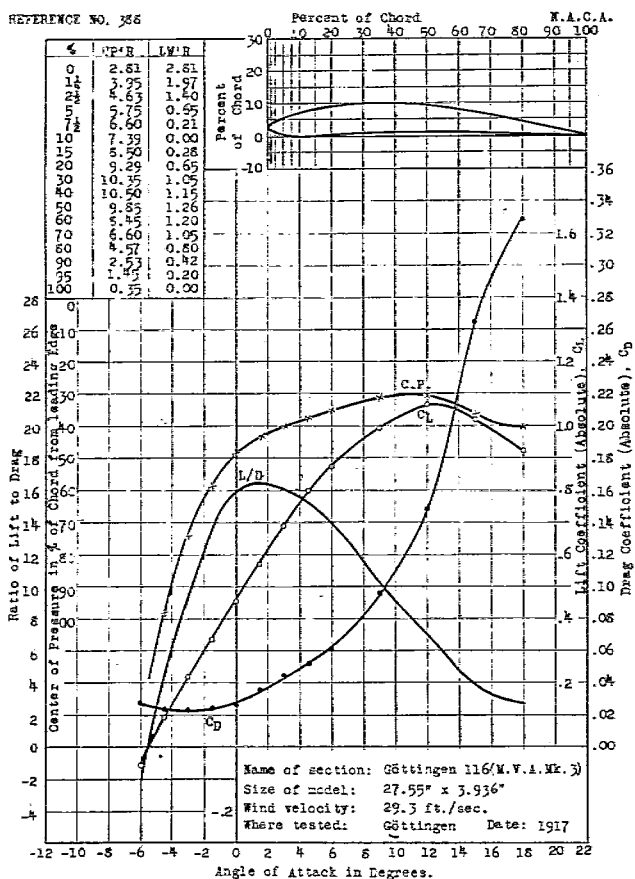
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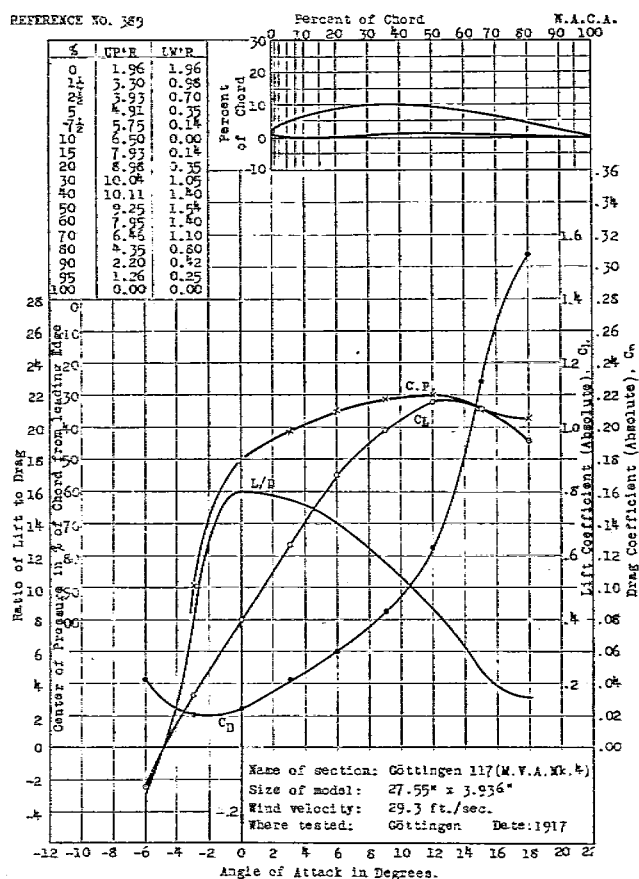
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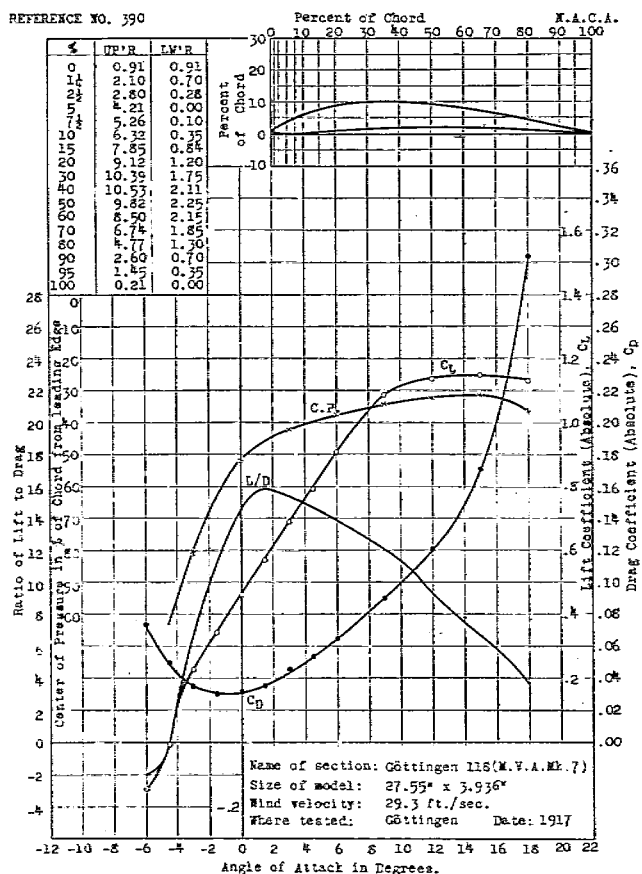
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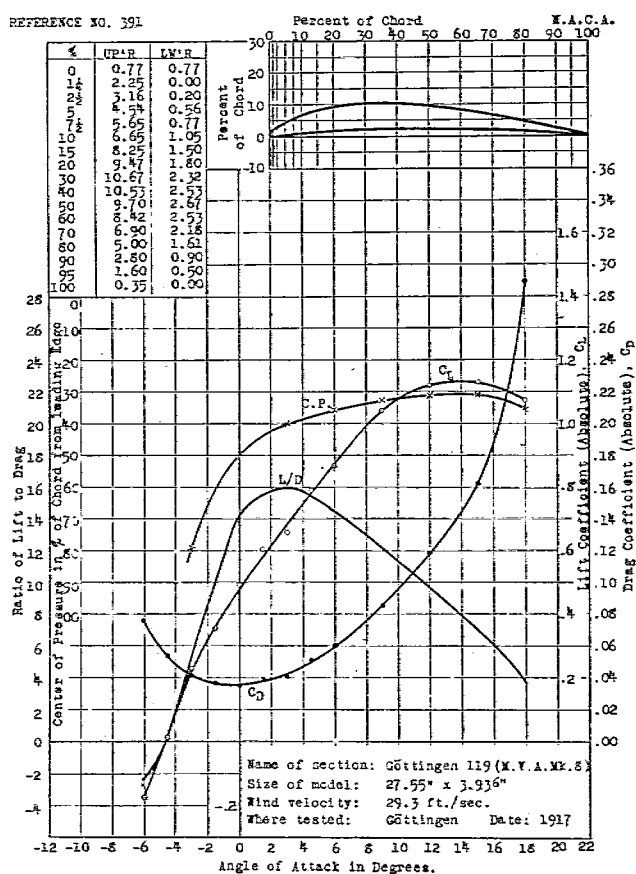
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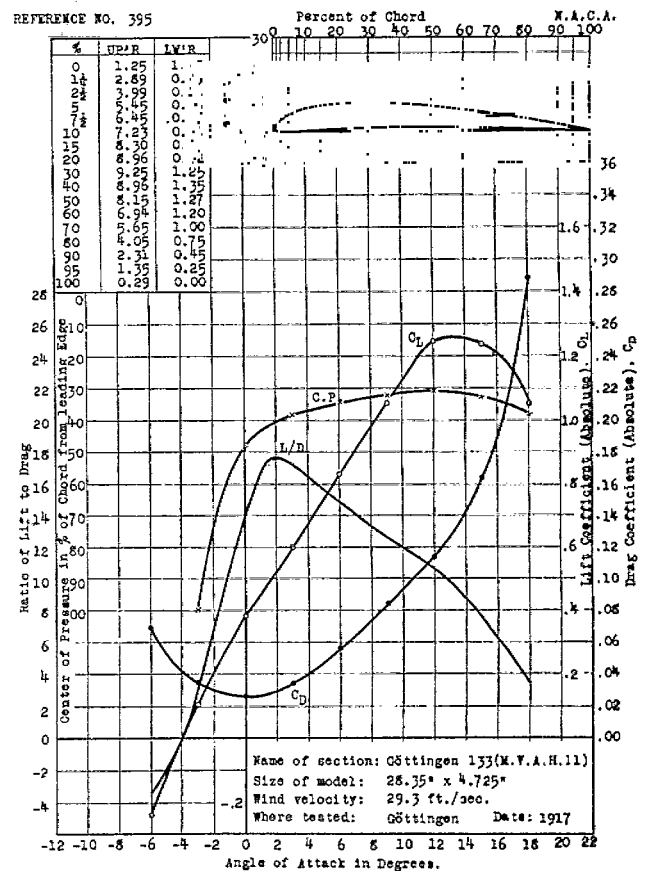
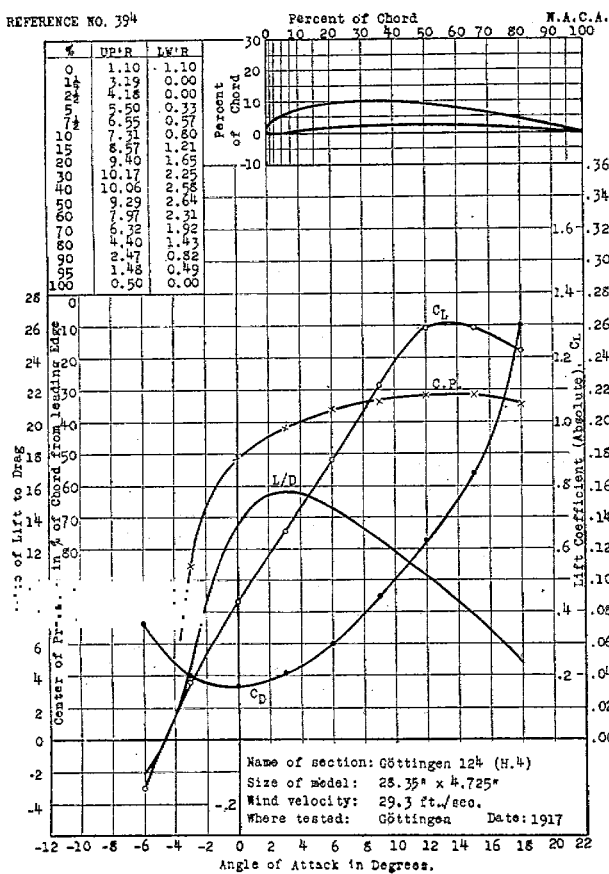
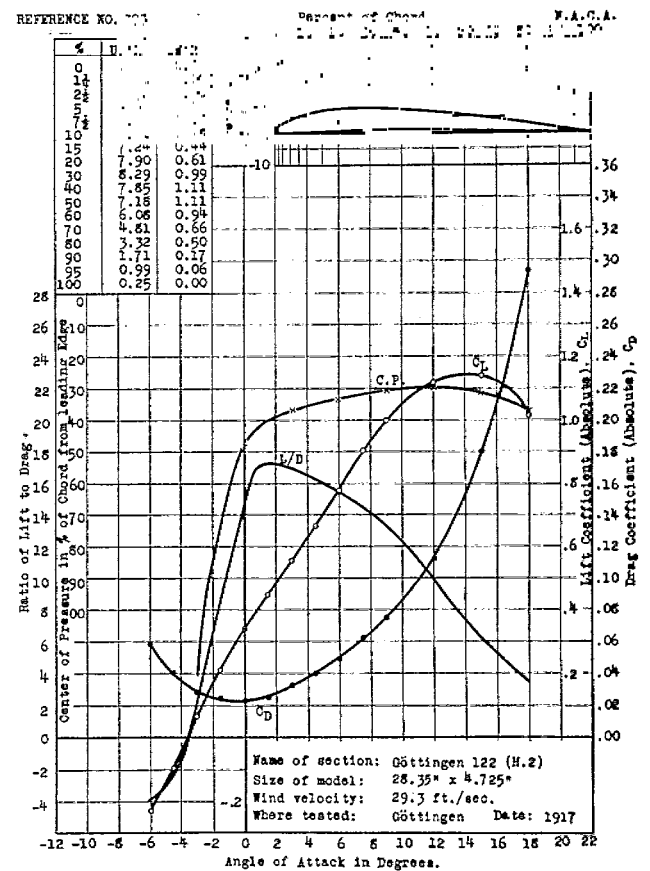
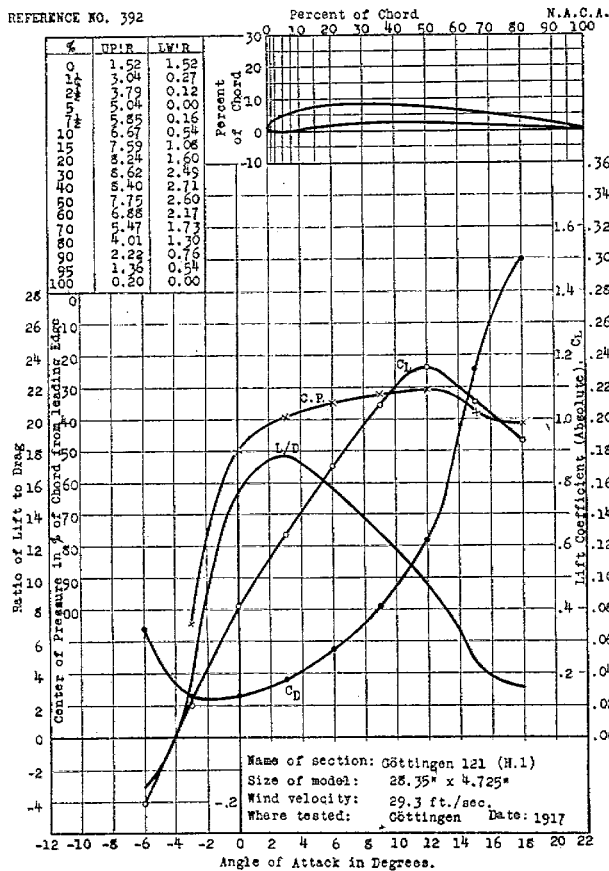


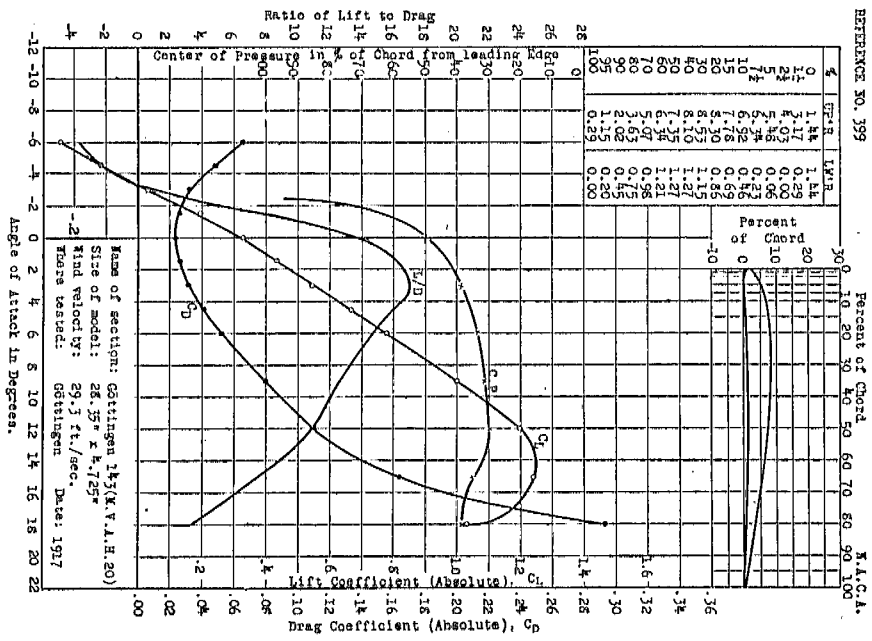
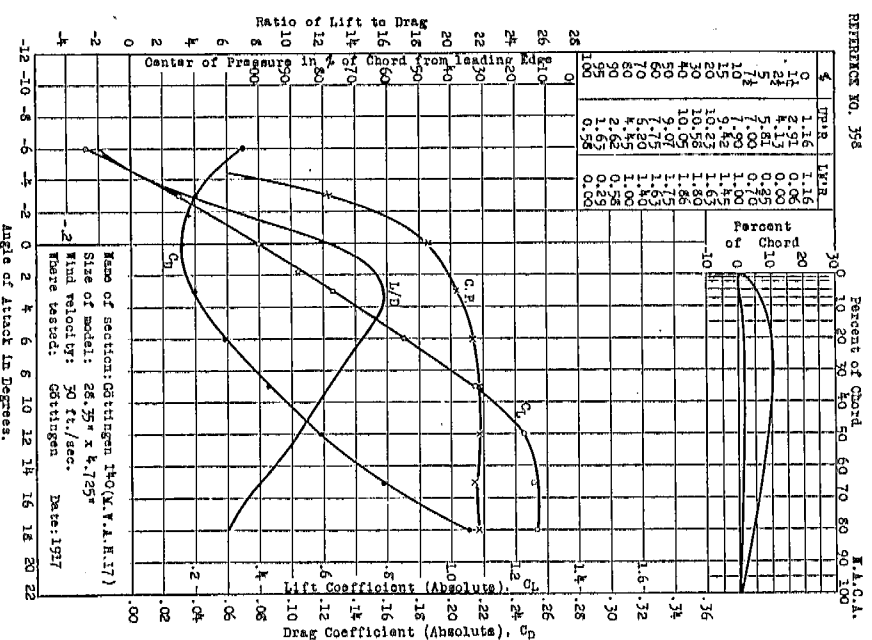
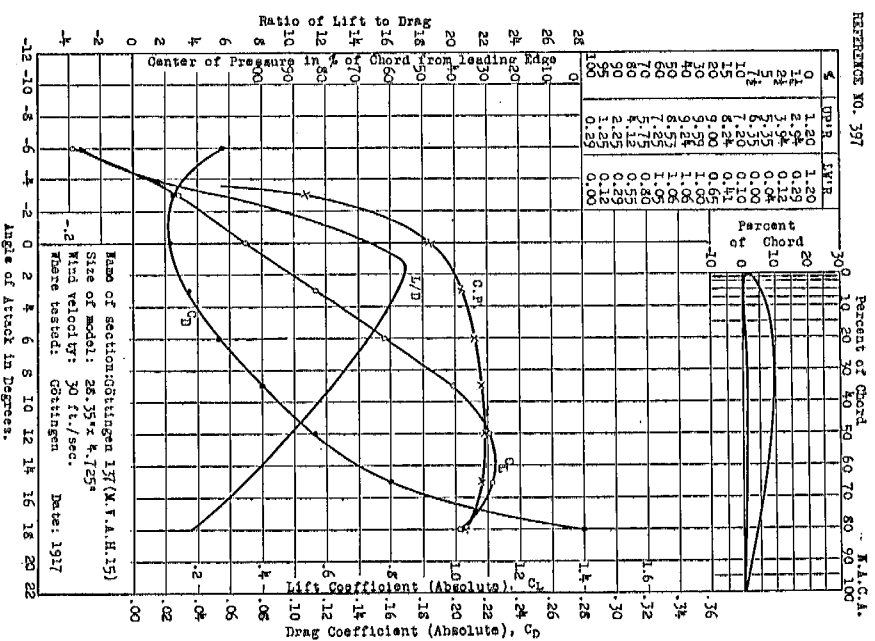
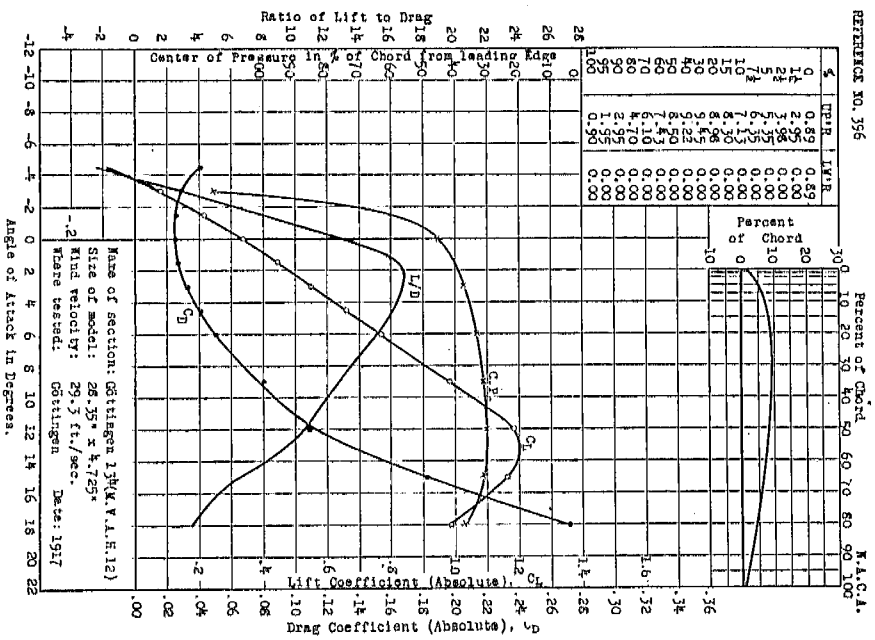
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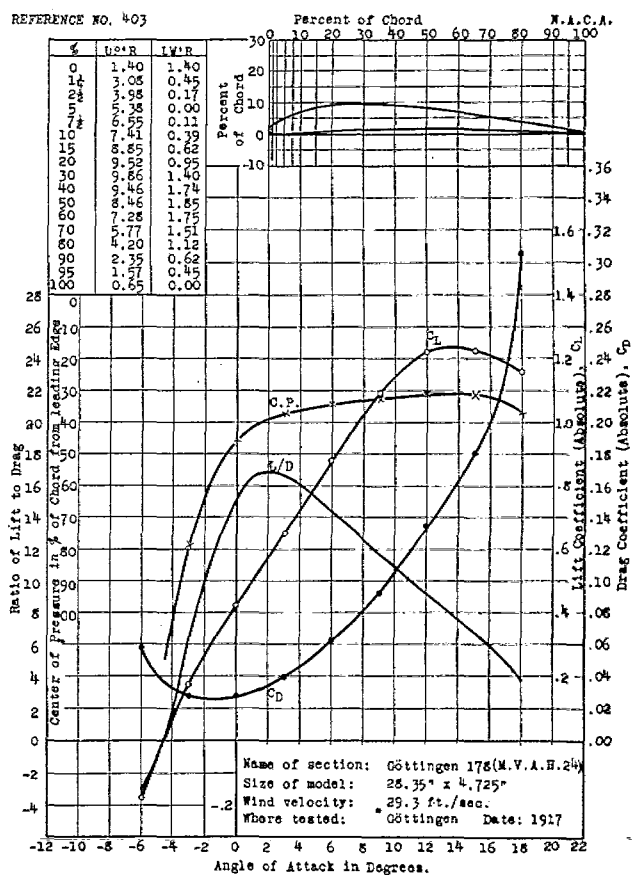
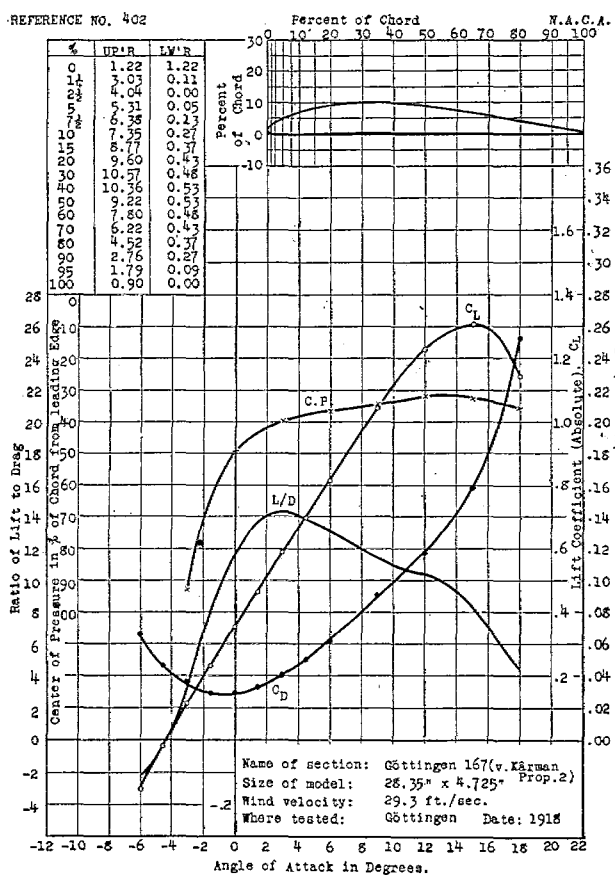
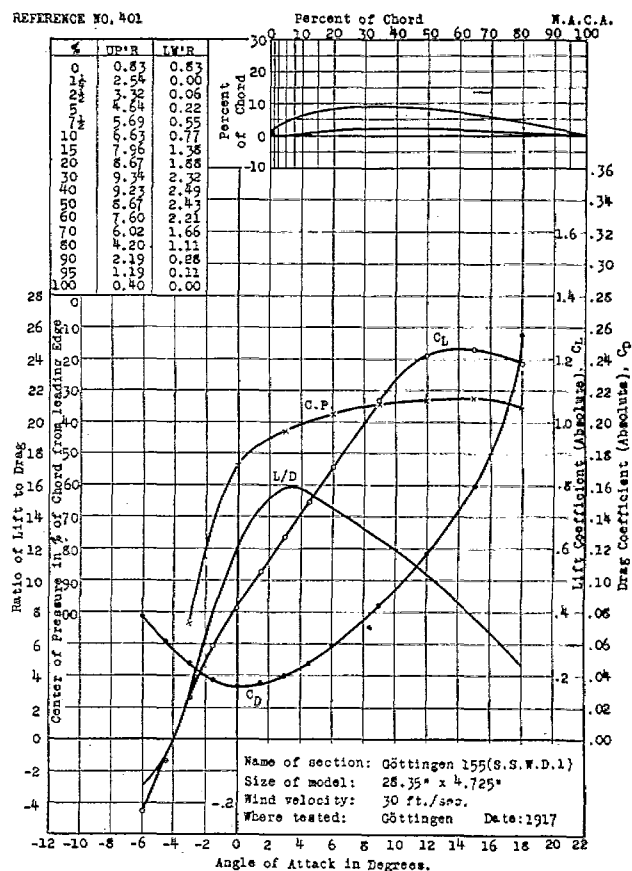
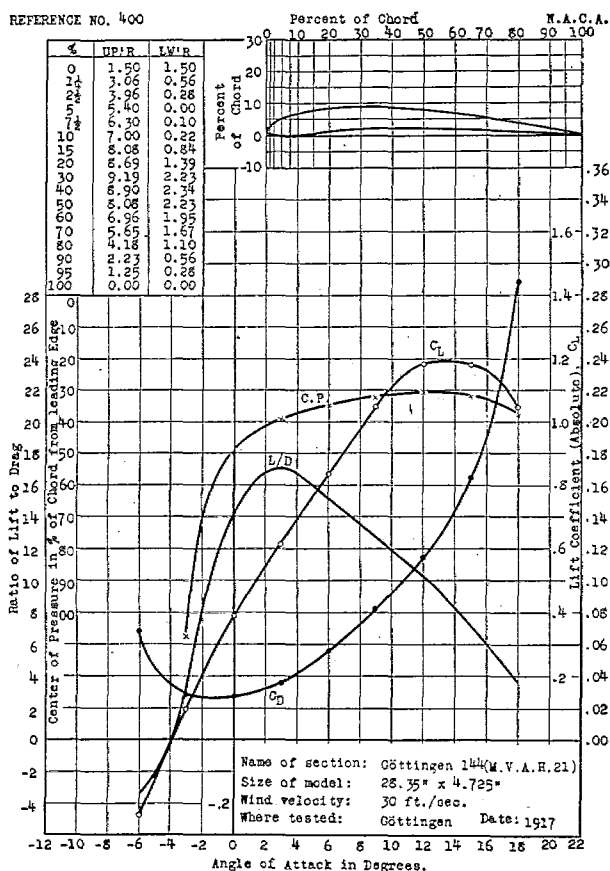


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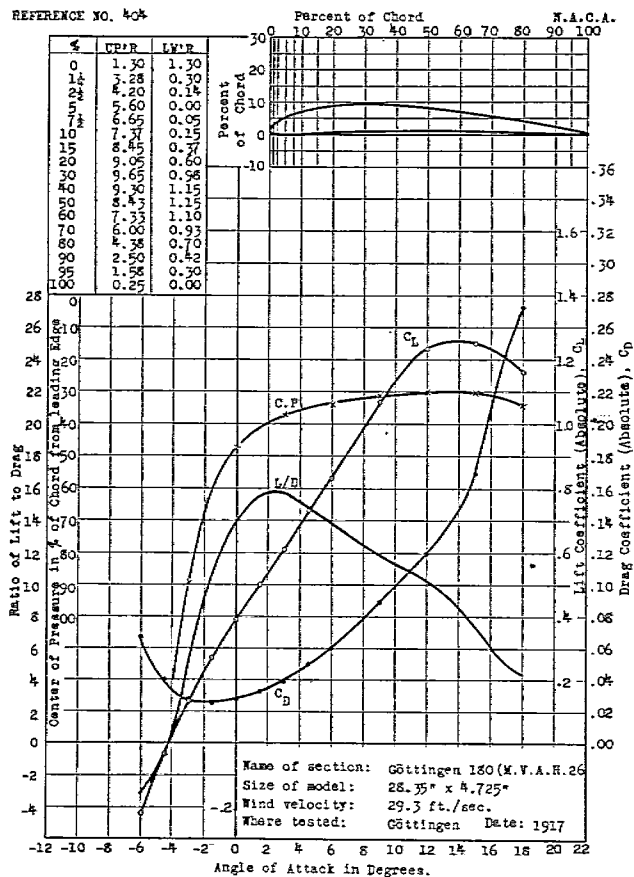




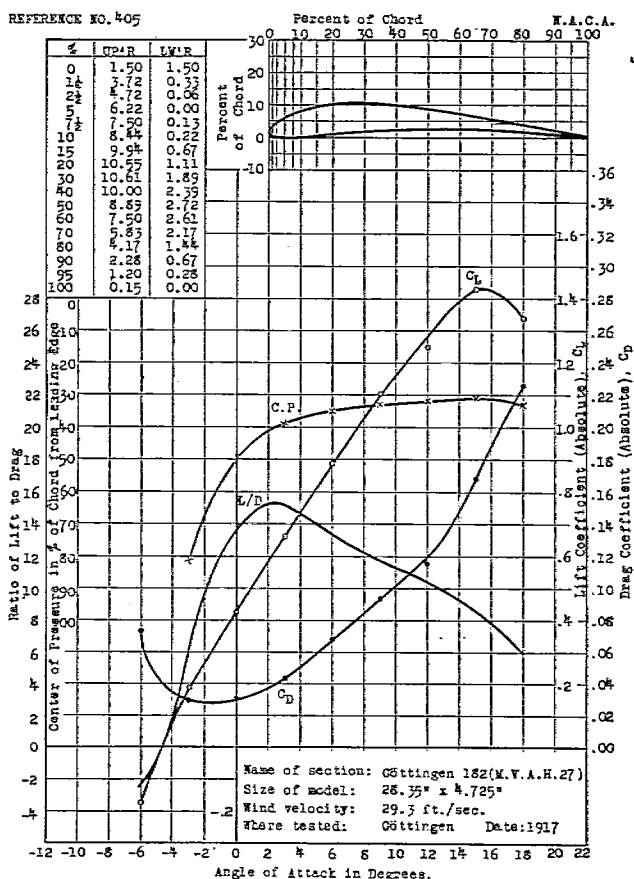




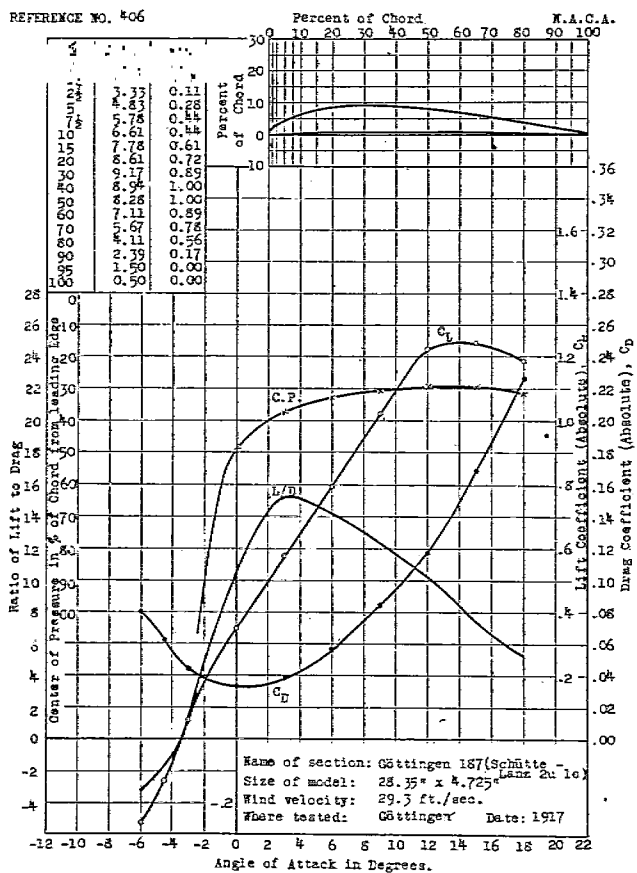
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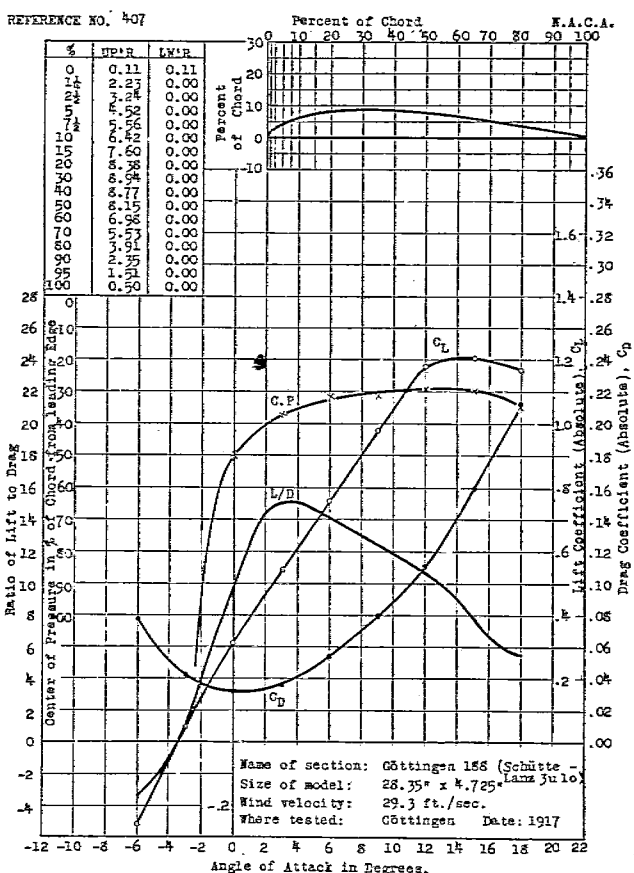
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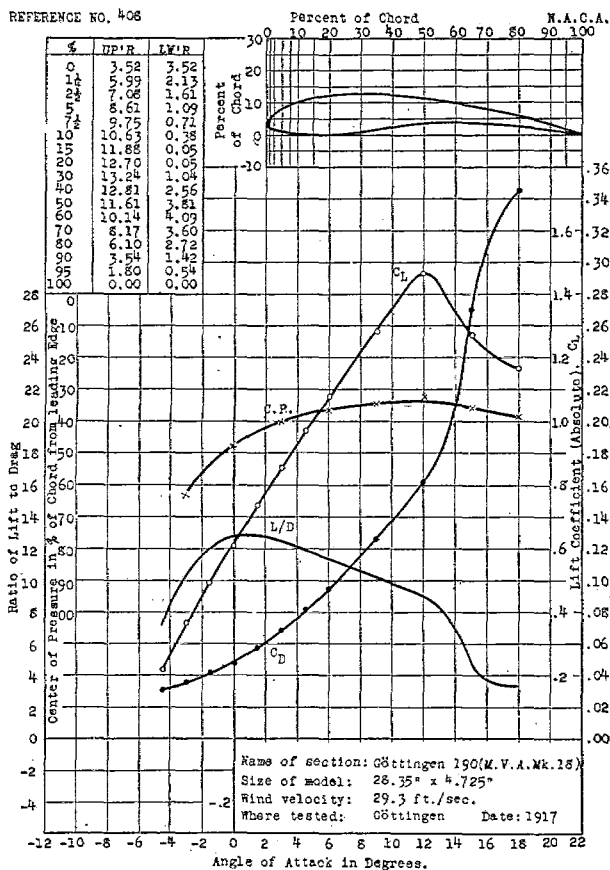
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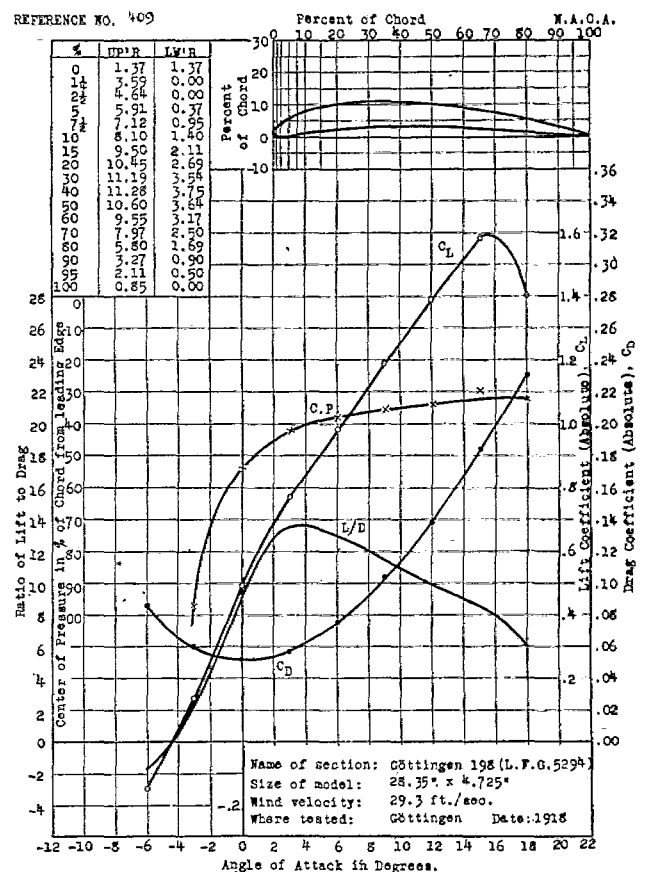
REFERENCE NO. 407



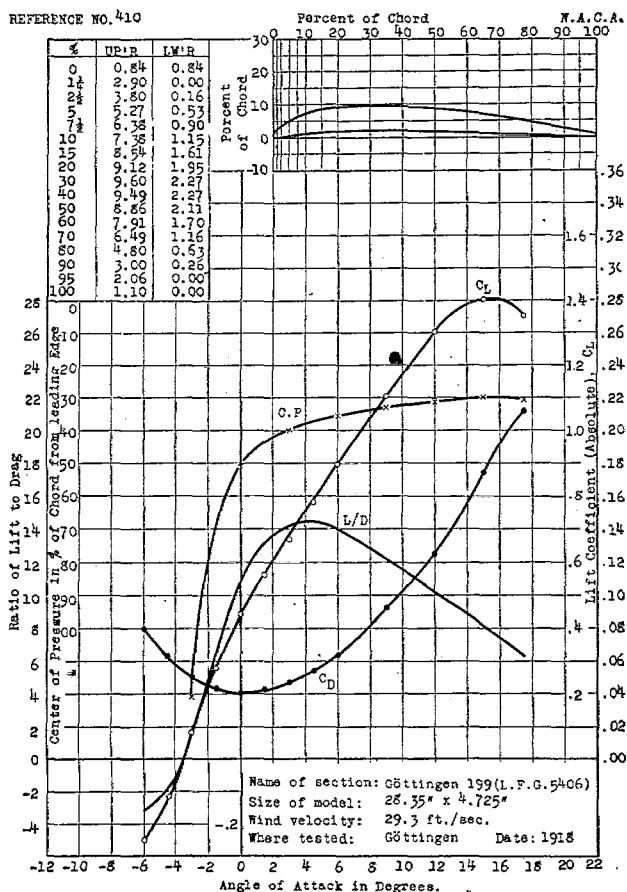
REFERENCE NO. 408



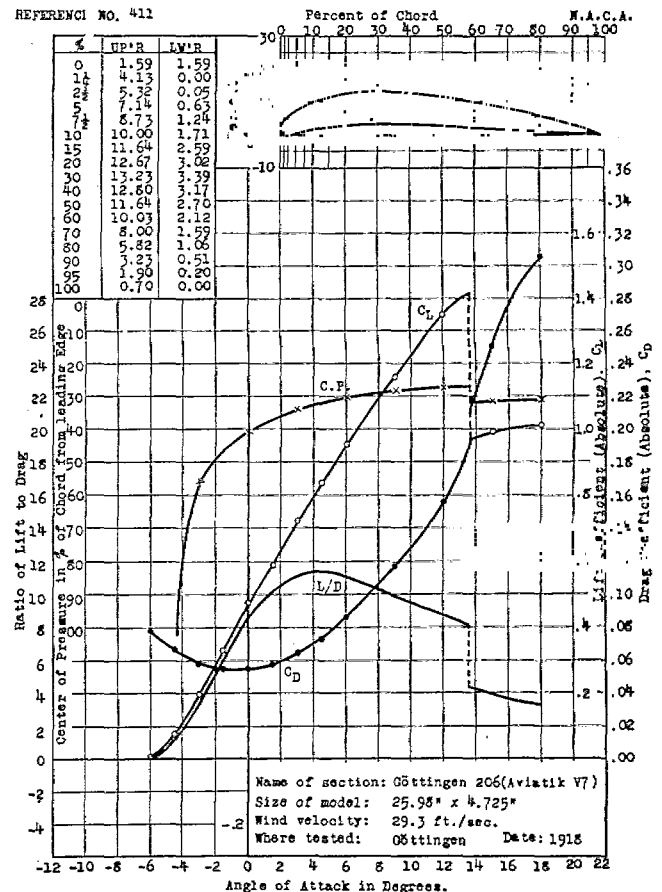
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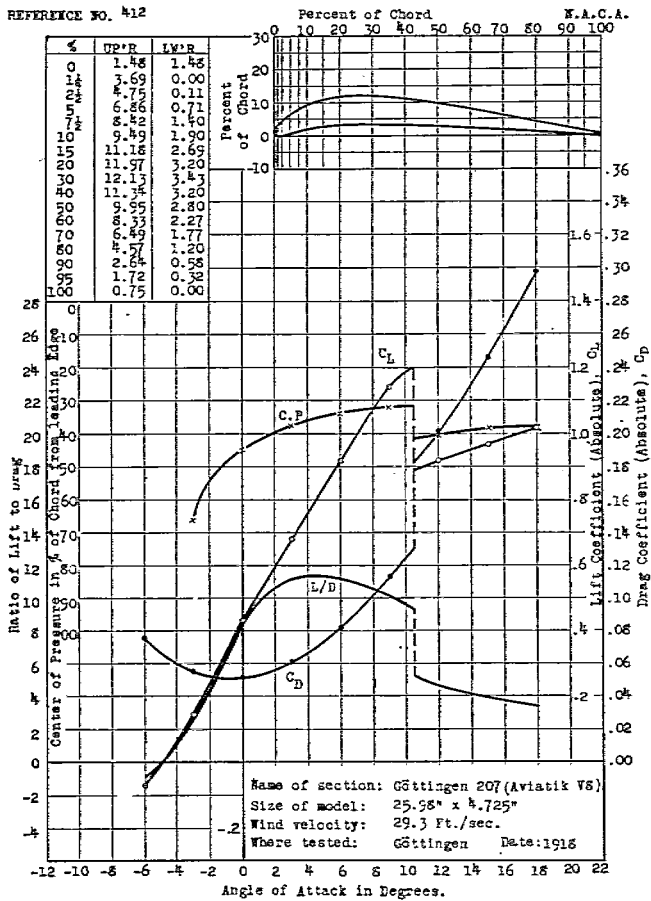
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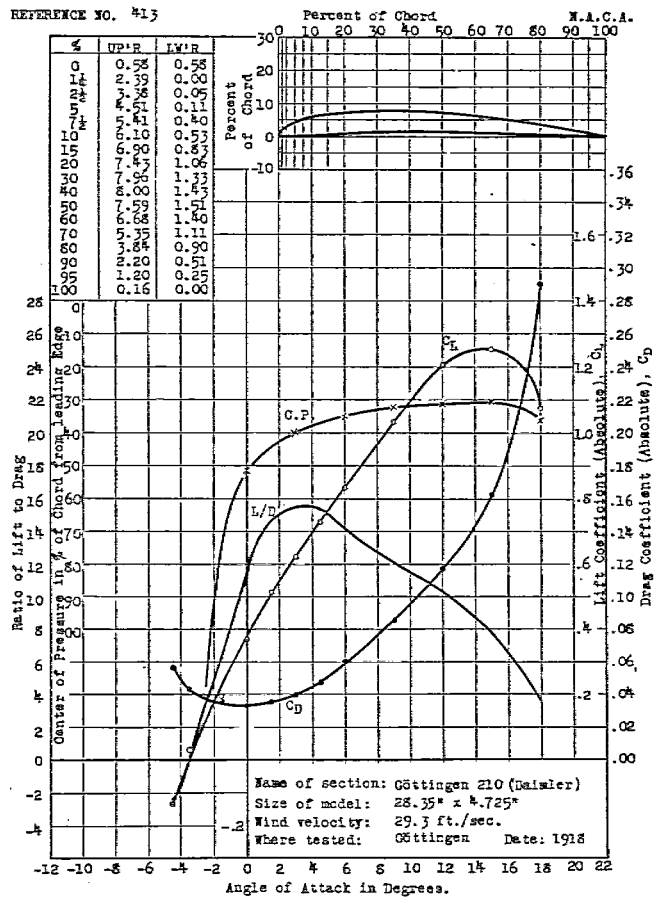
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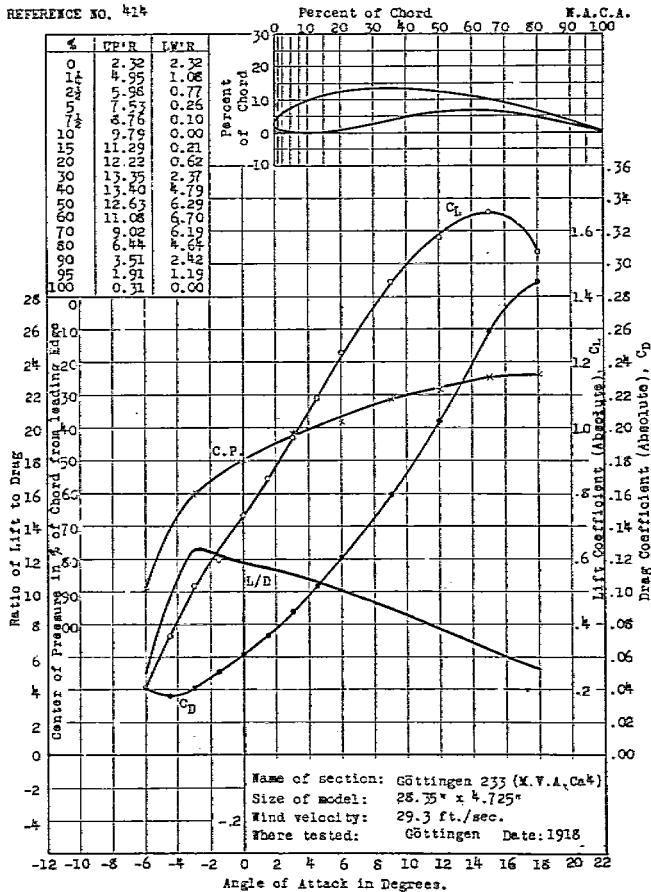
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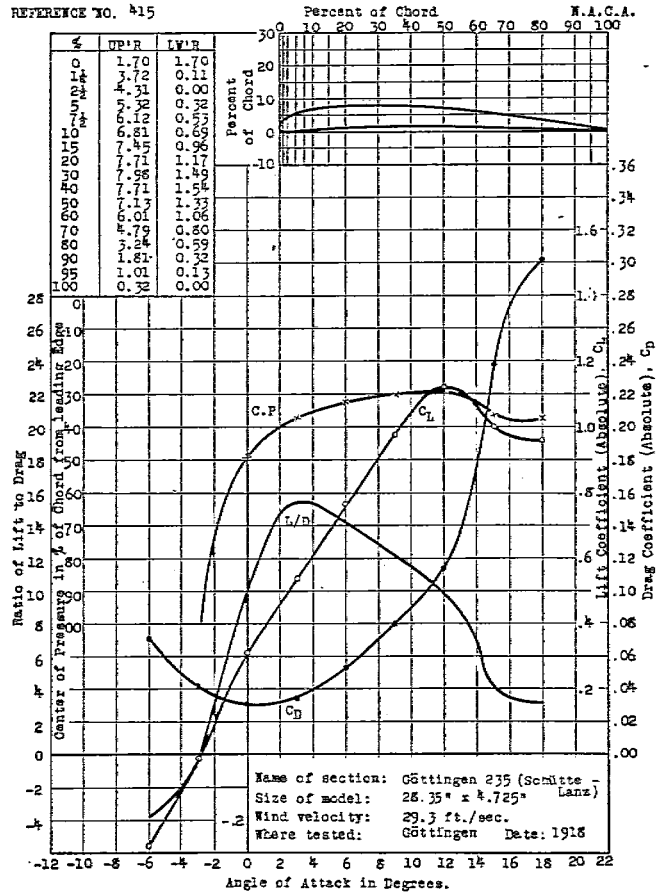
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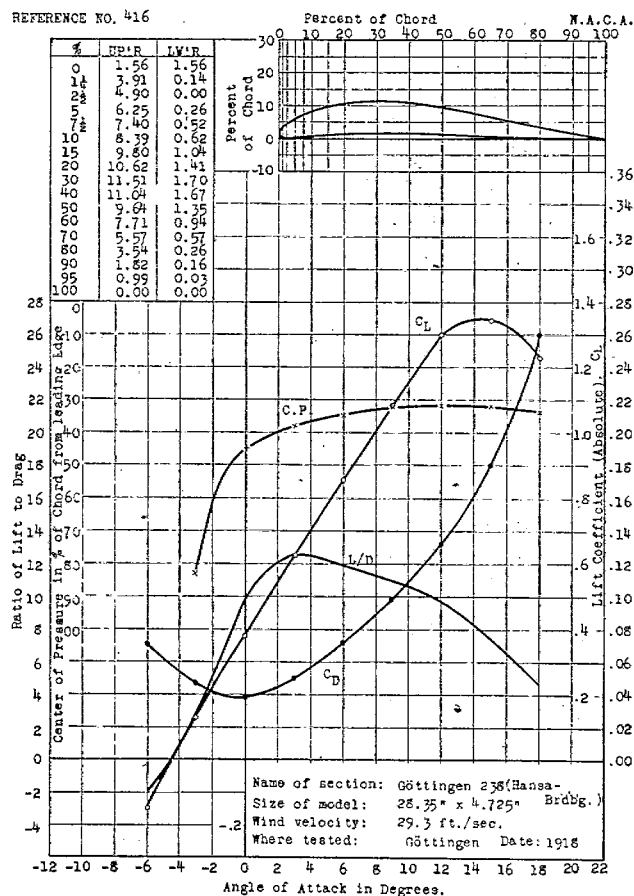
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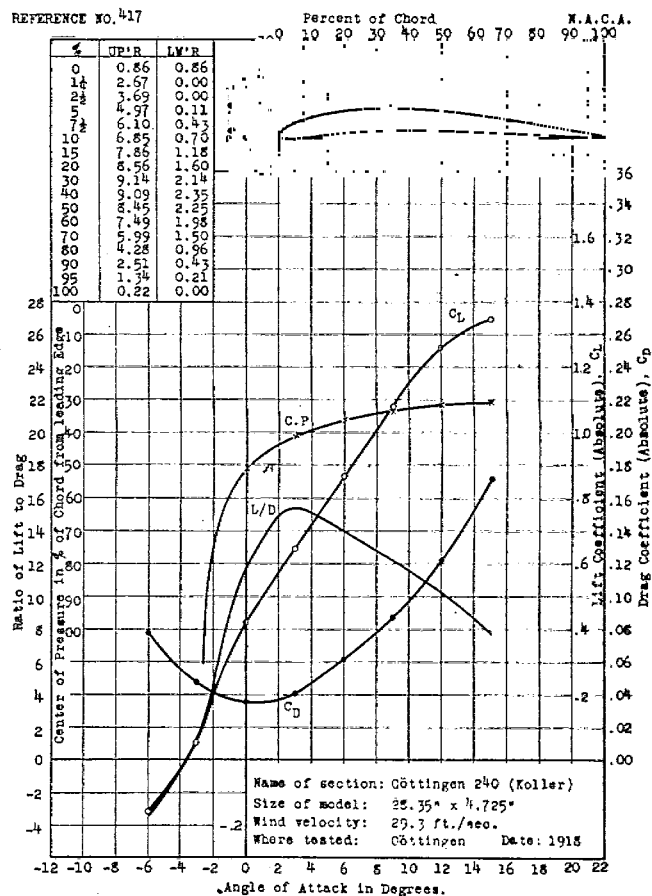
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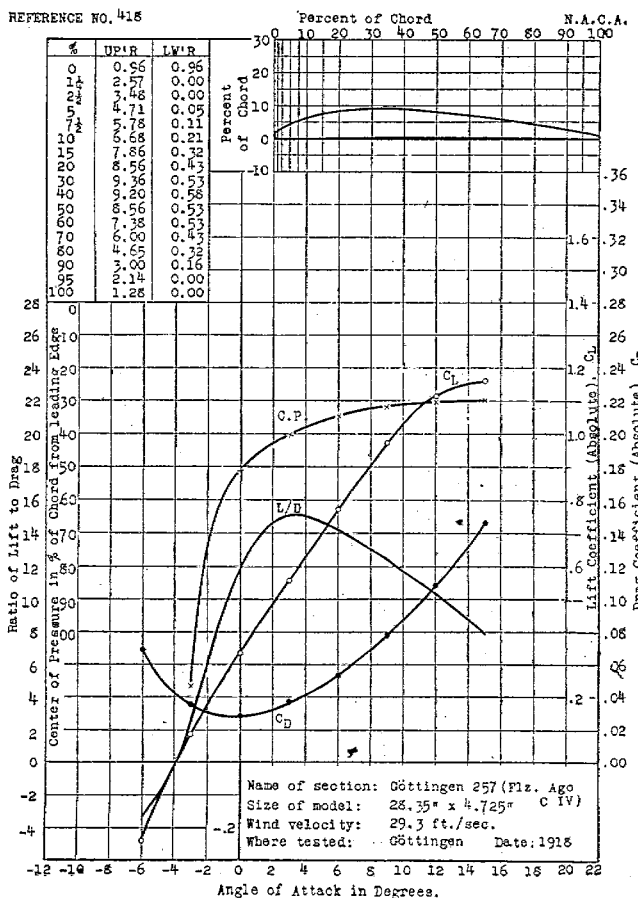
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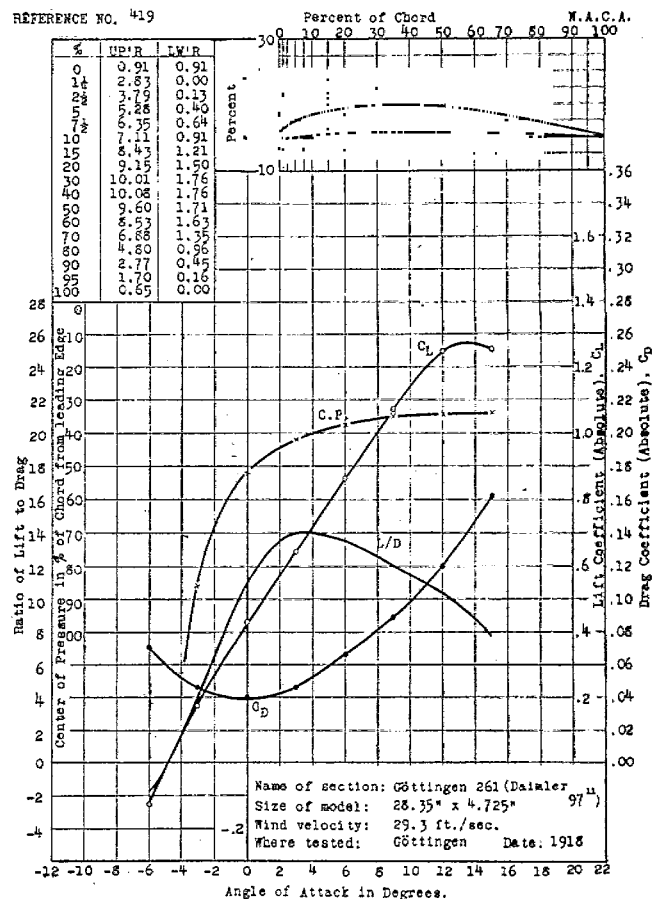
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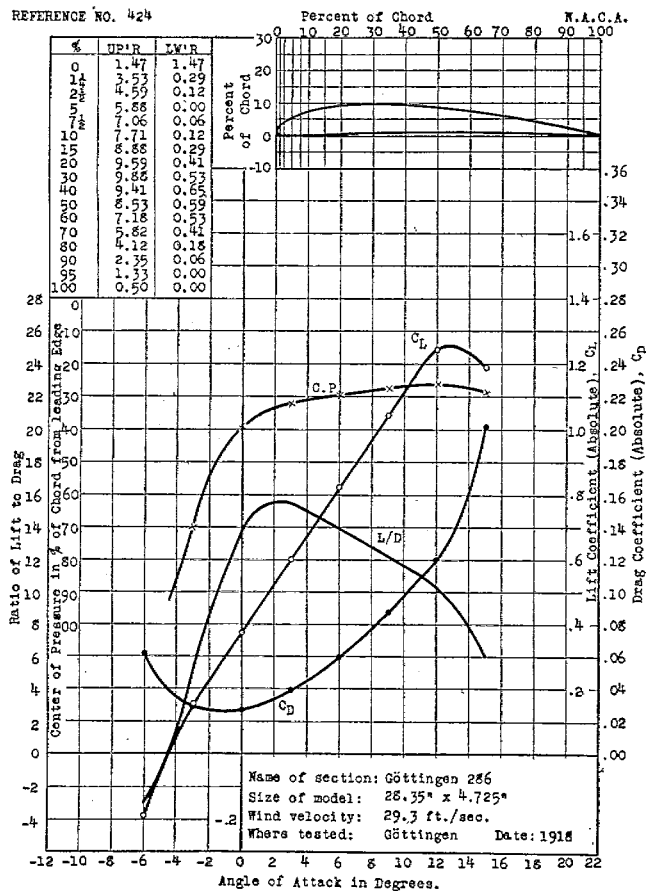
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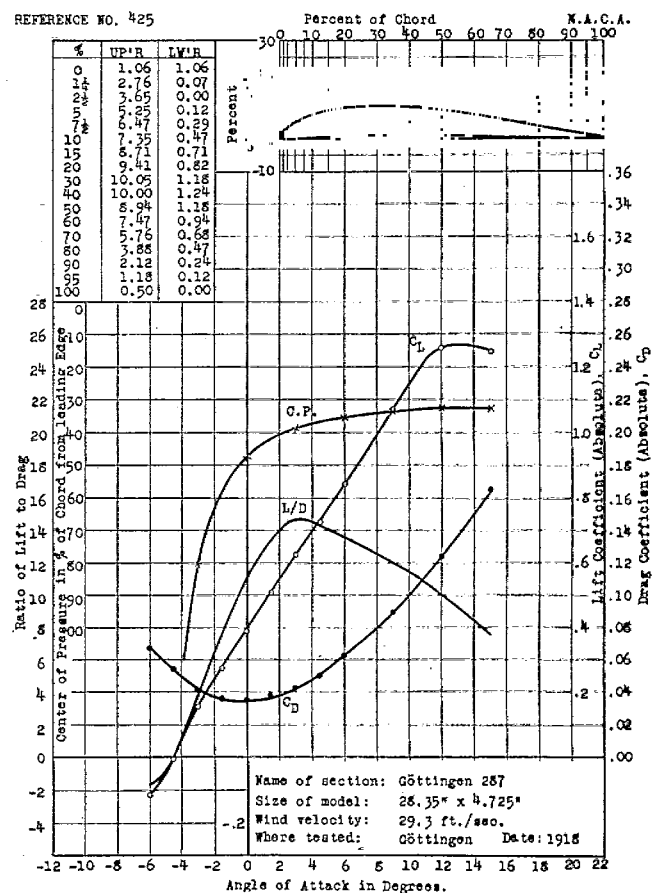
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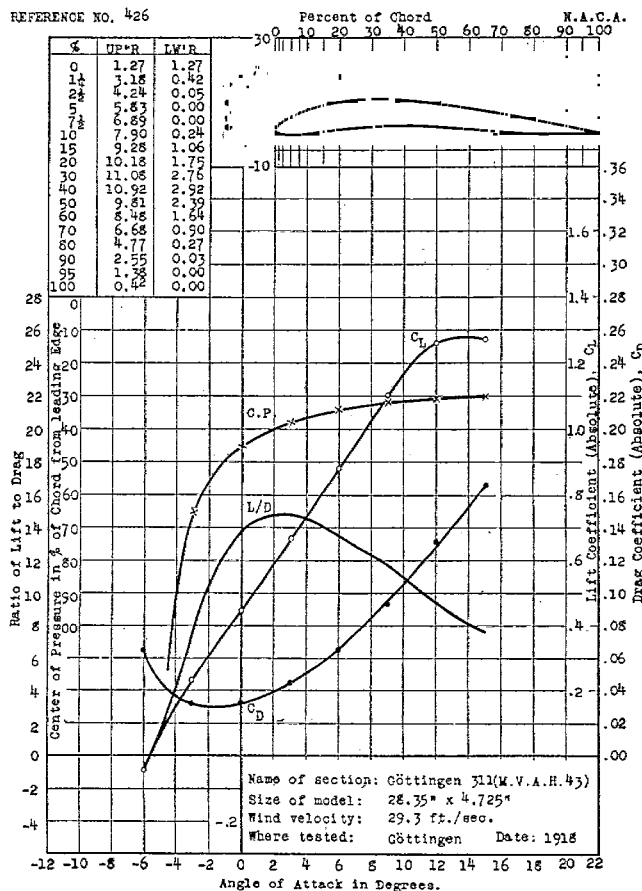
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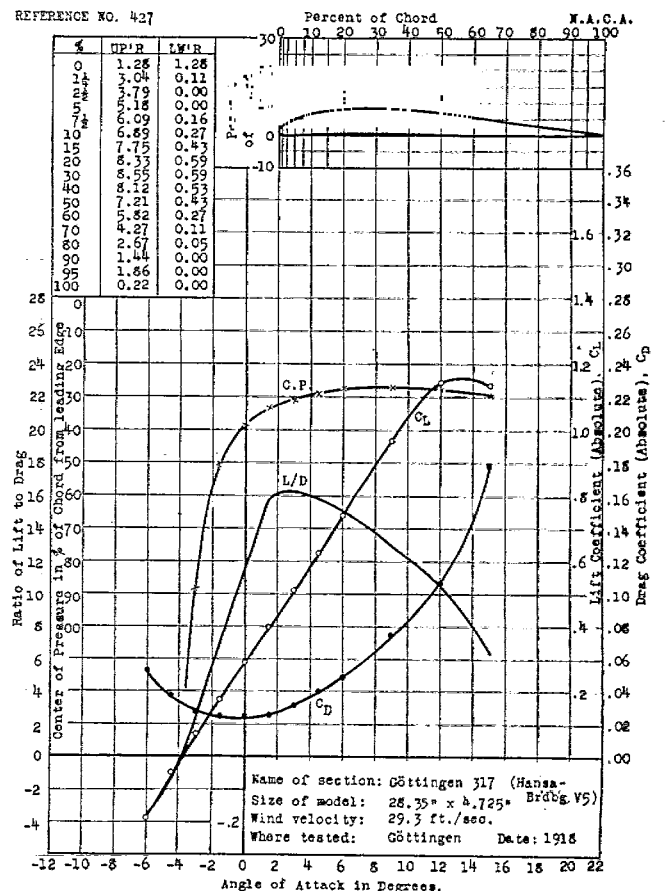
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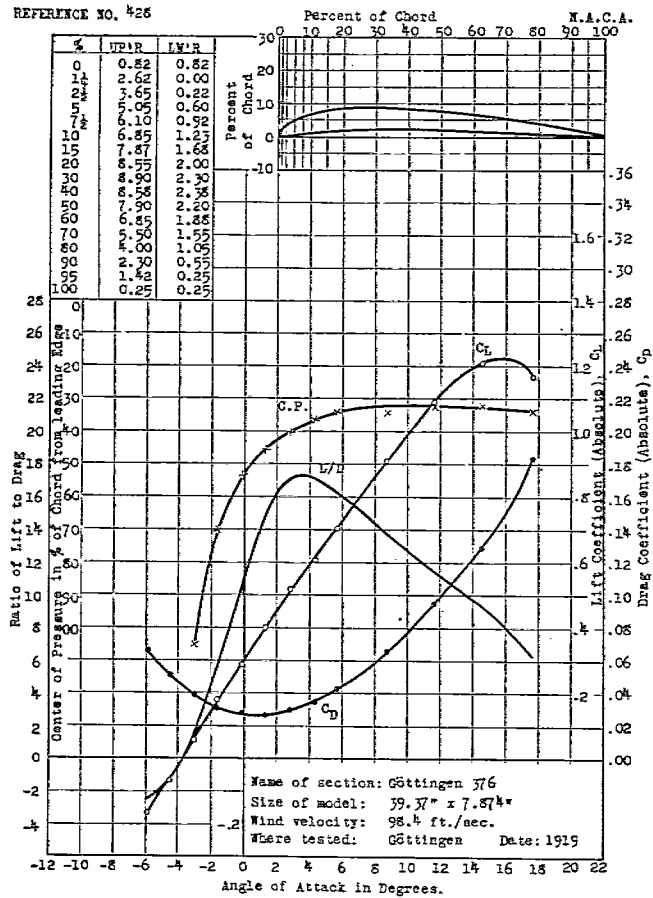
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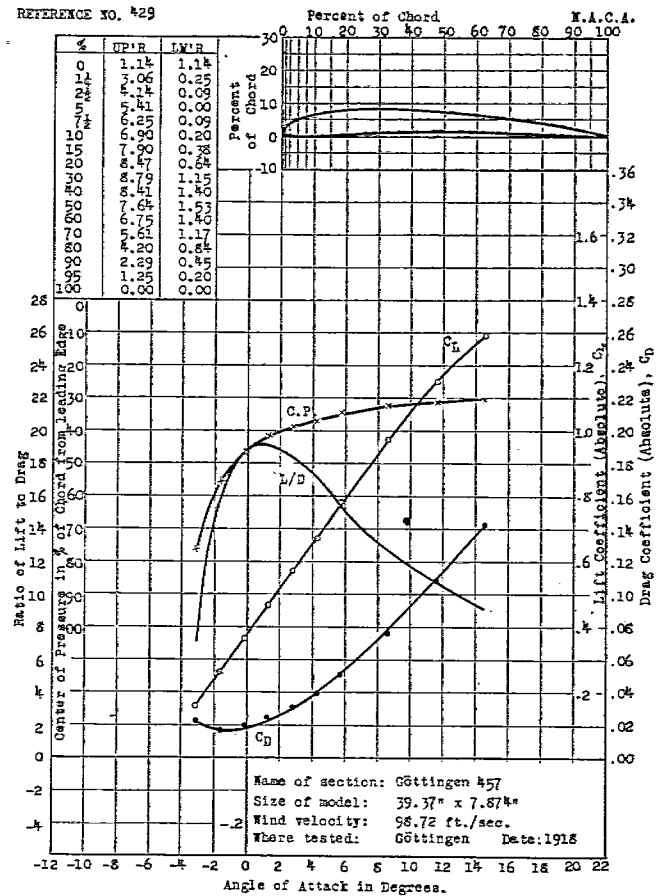
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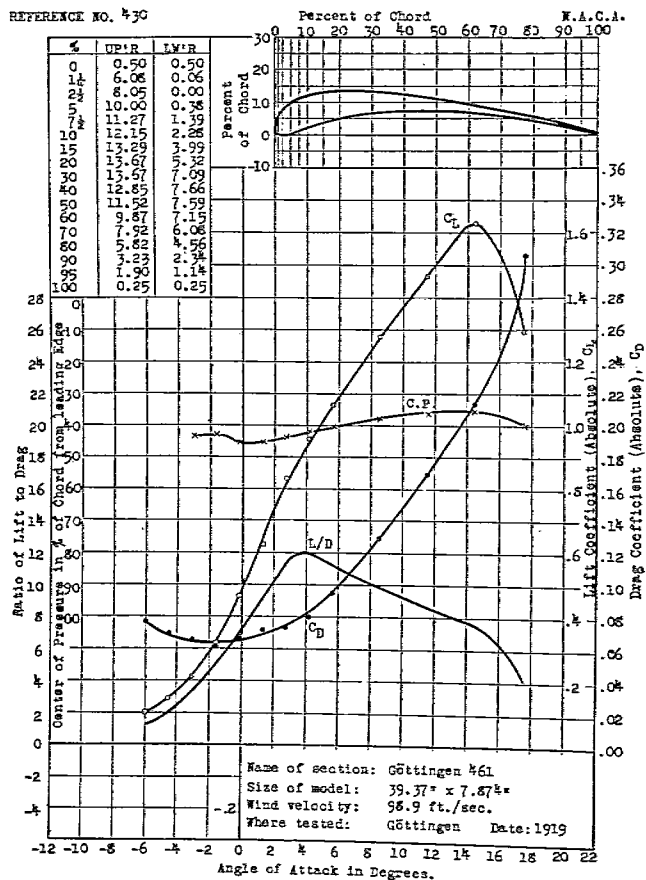
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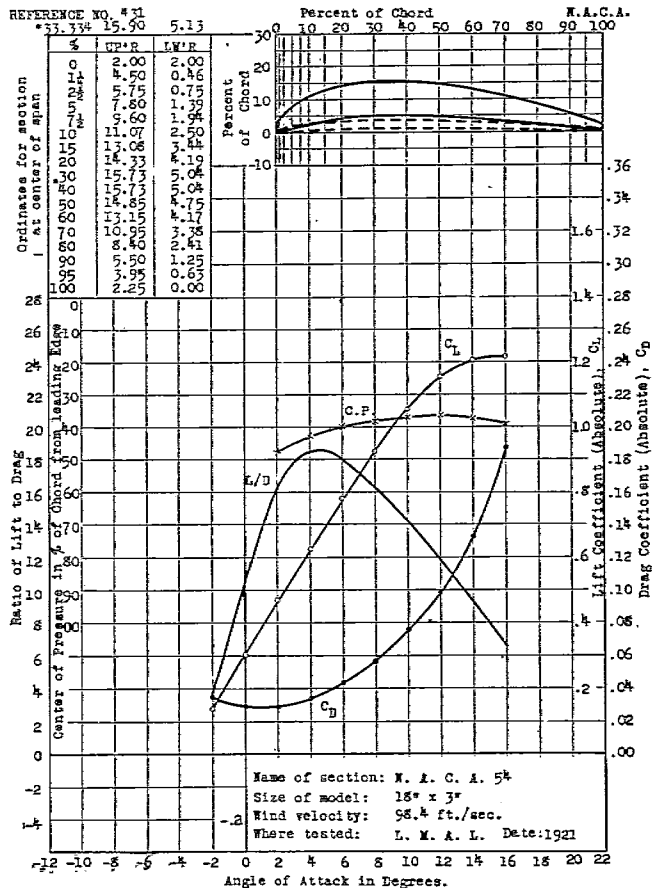
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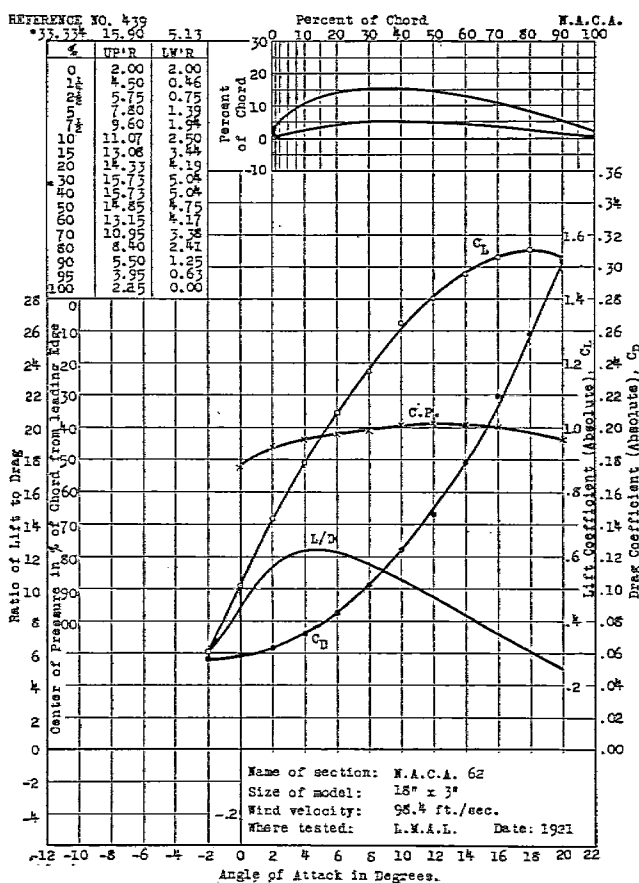
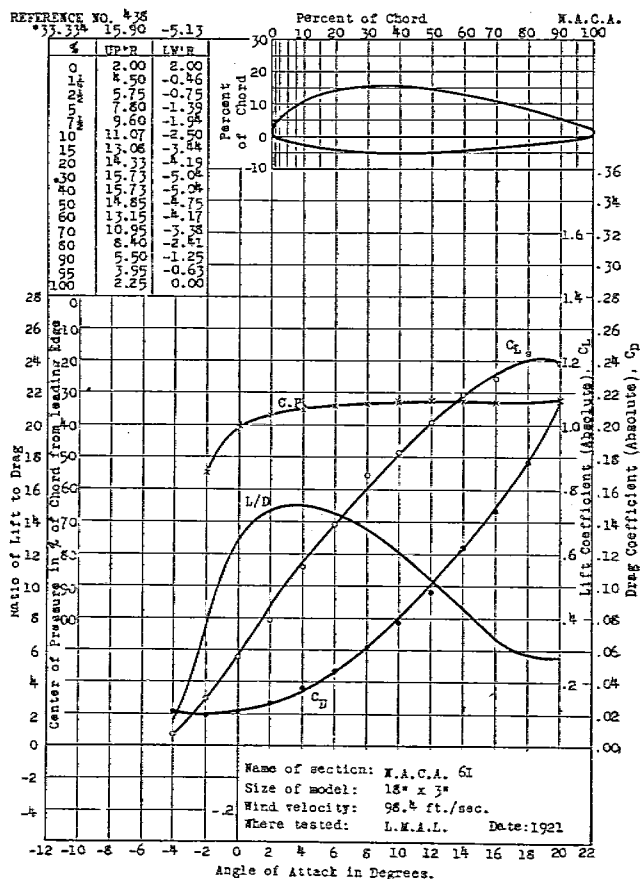
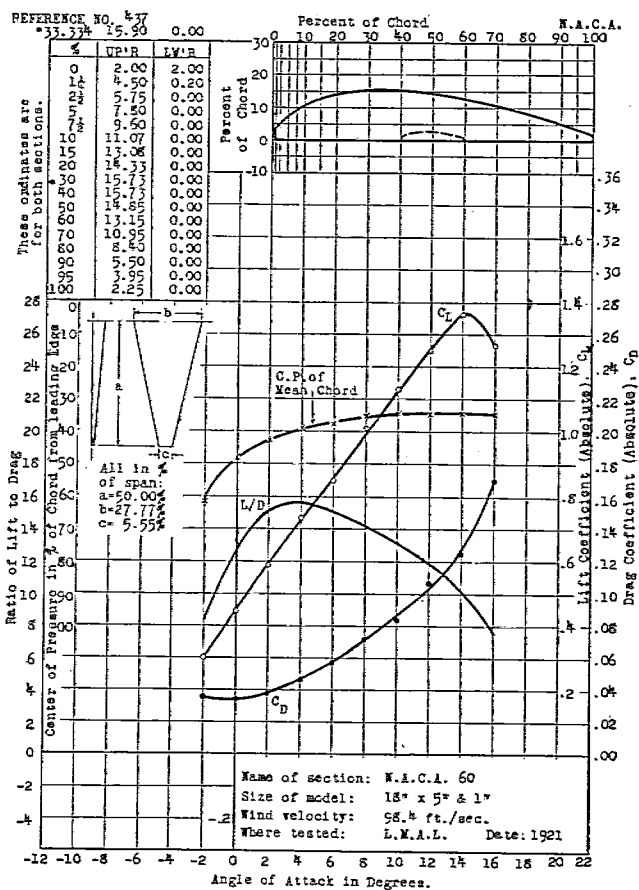
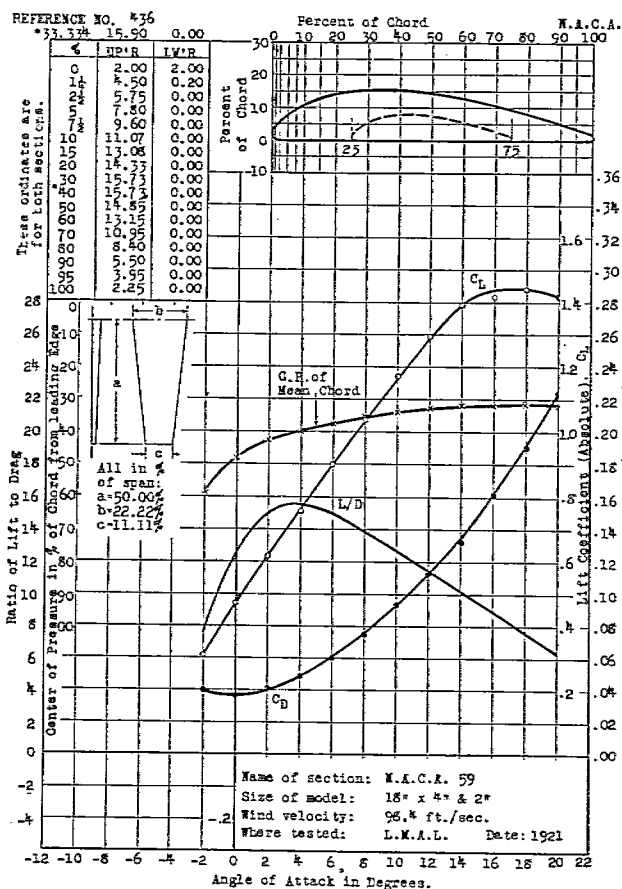


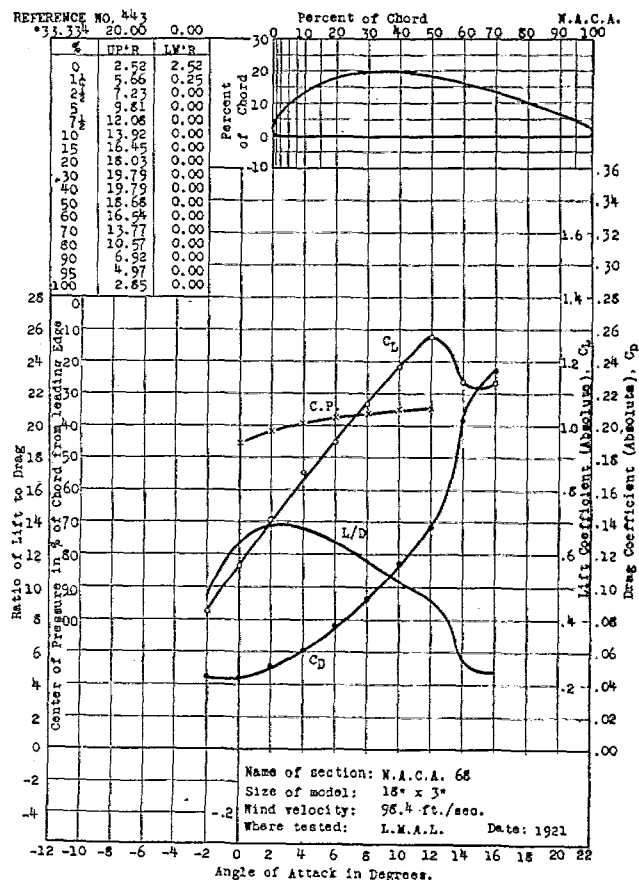
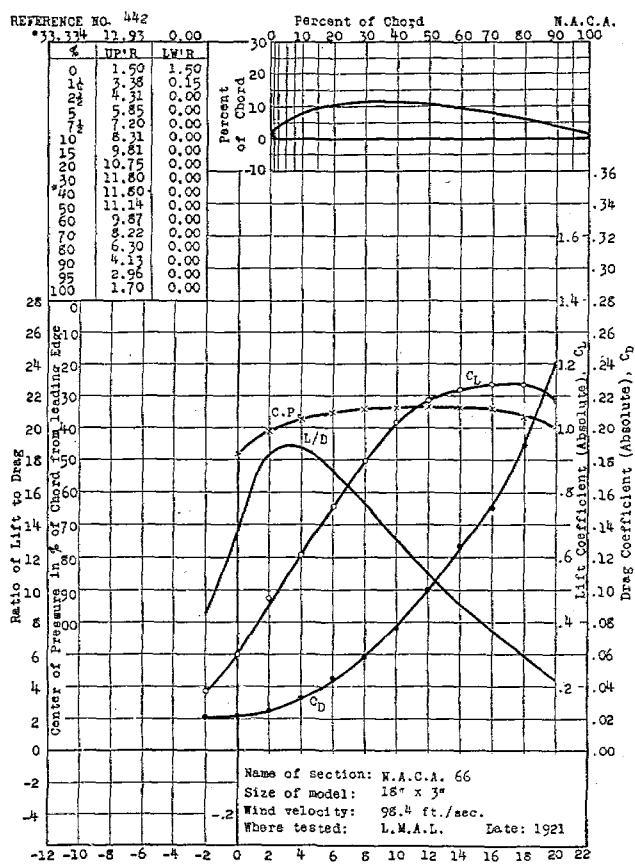
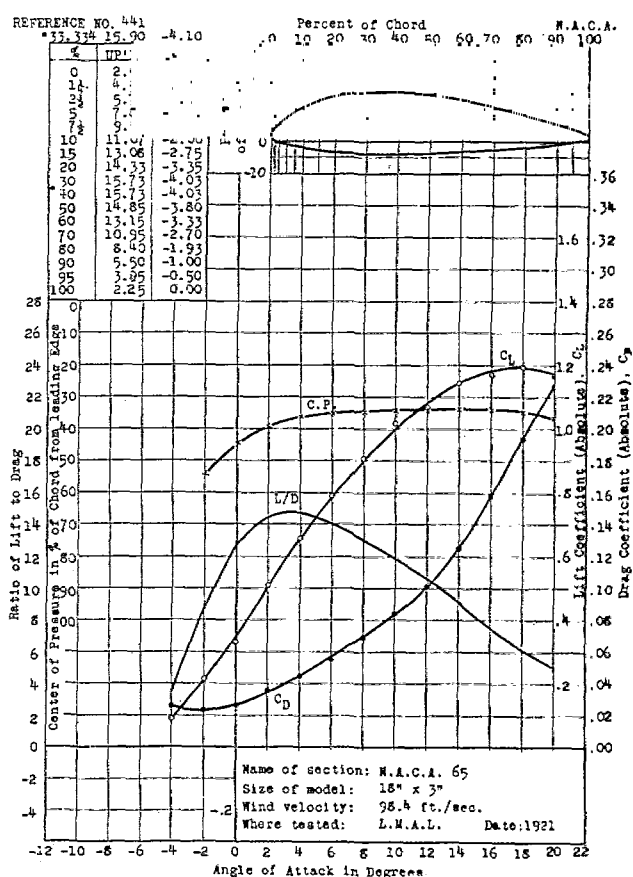
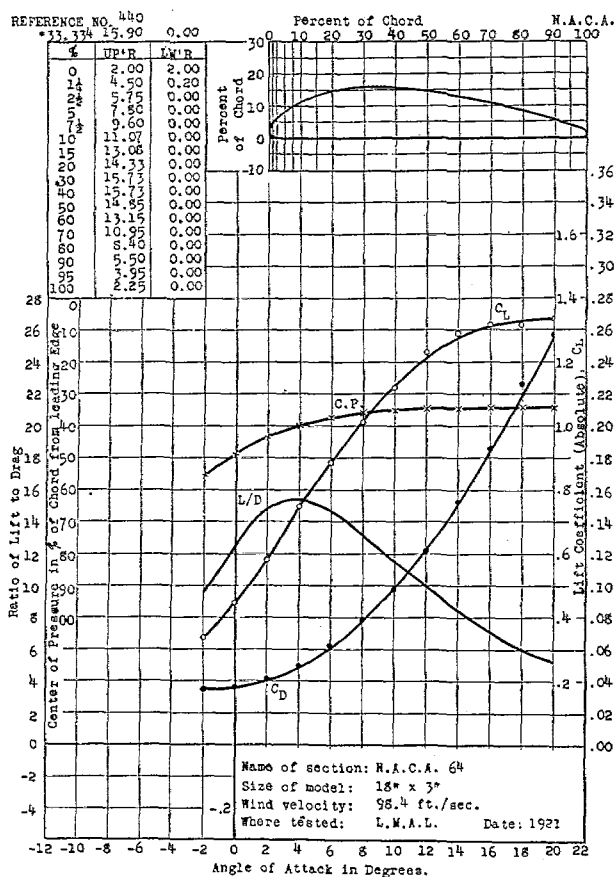
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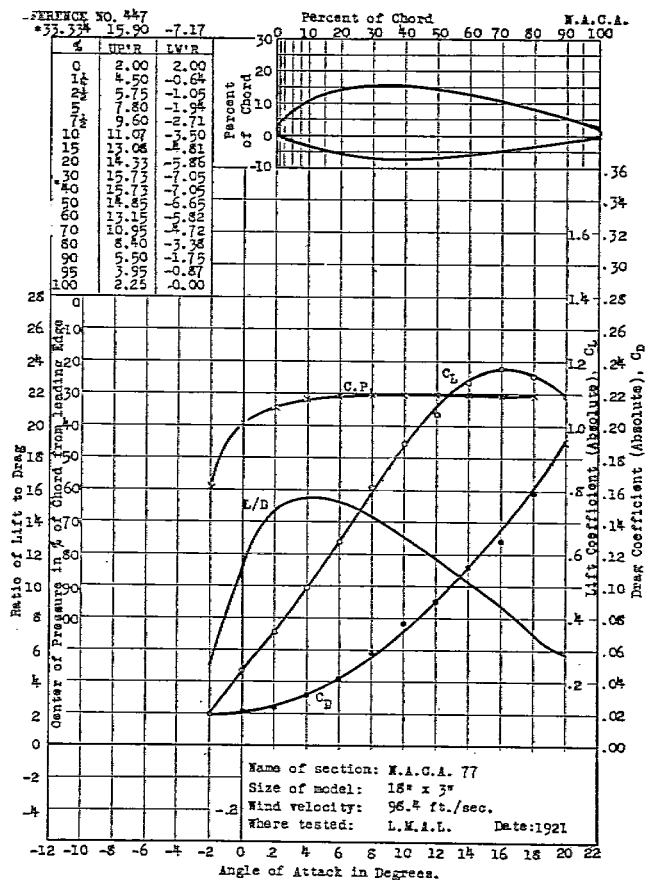
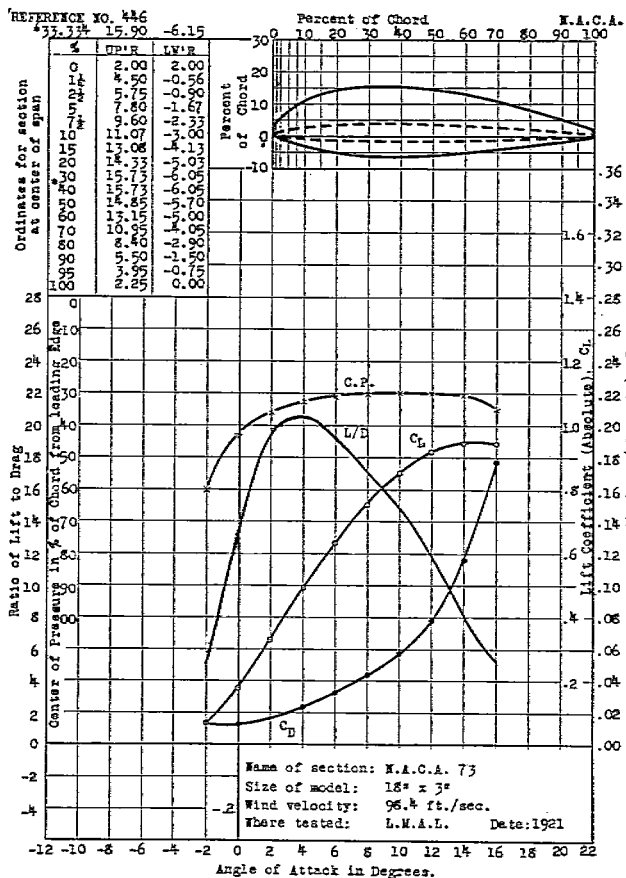
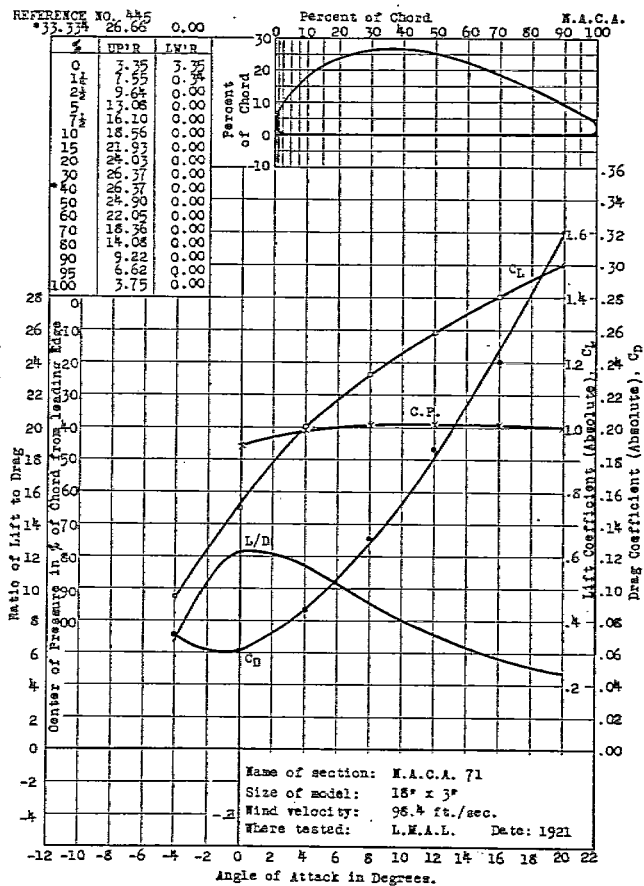
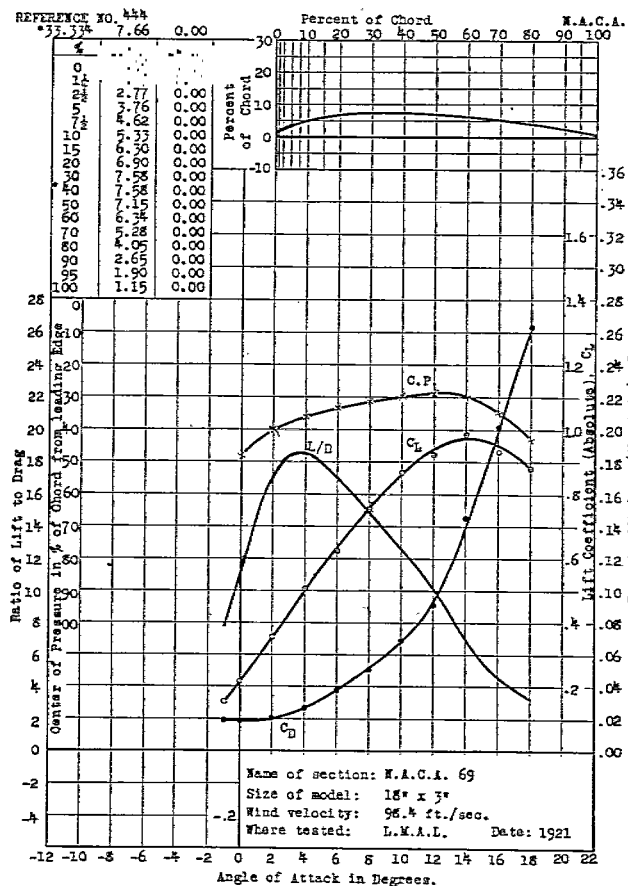


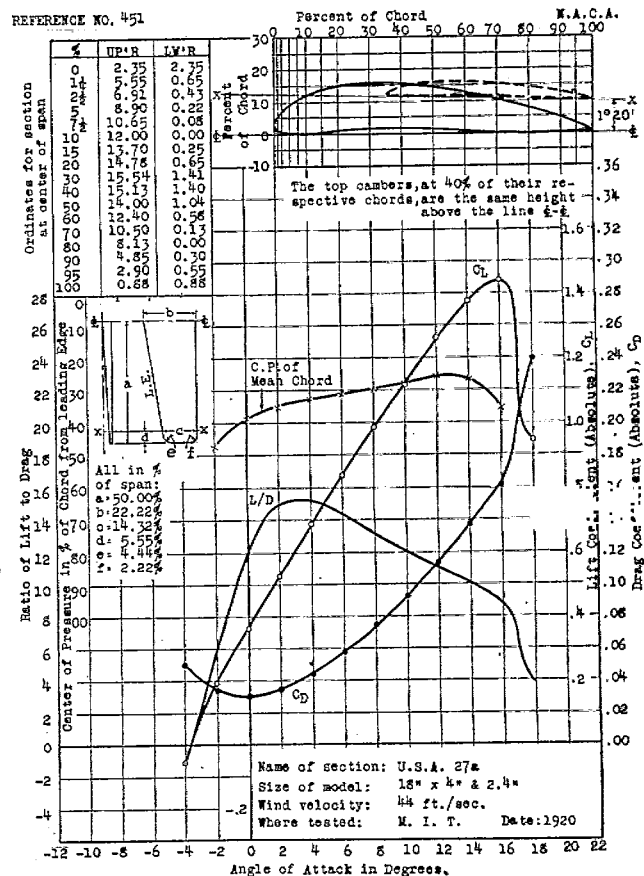
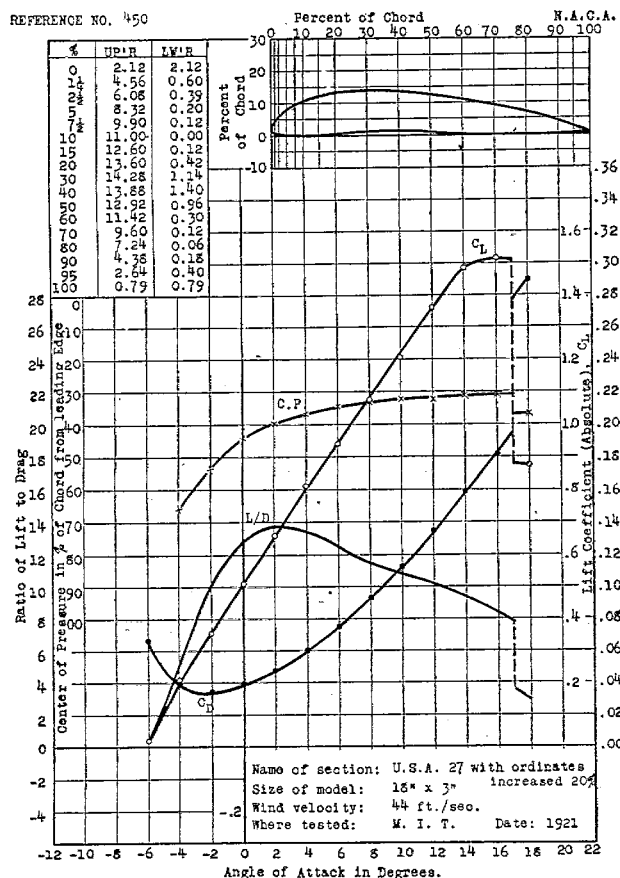
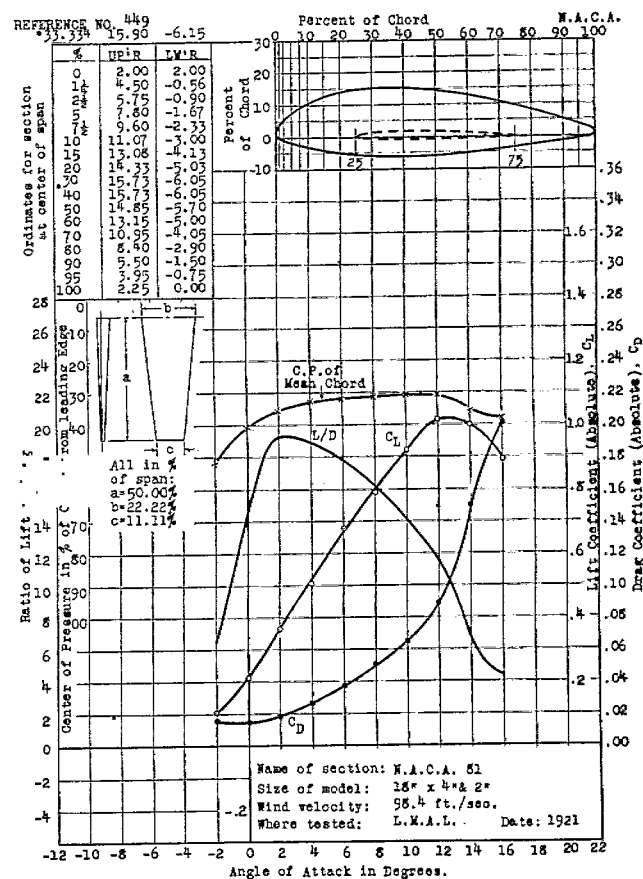
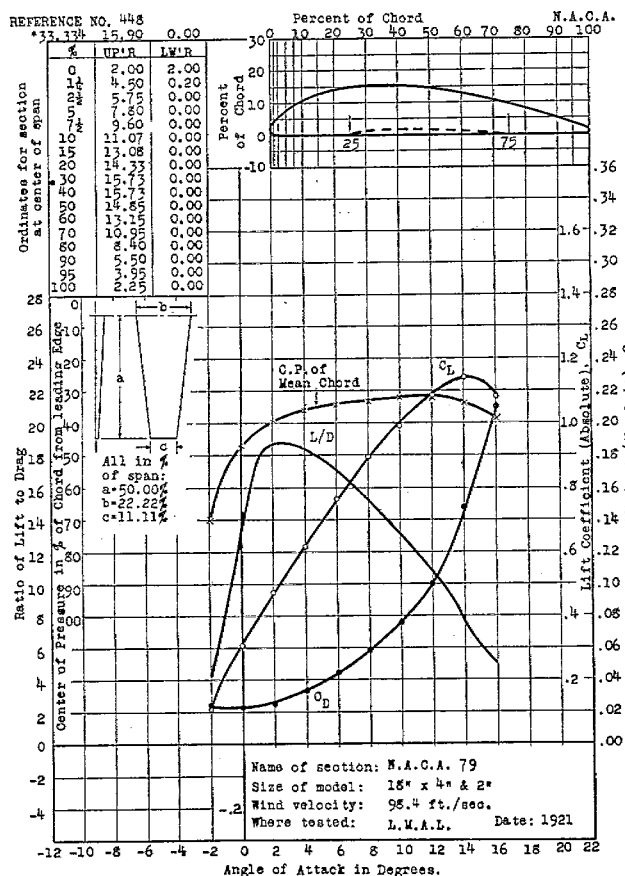
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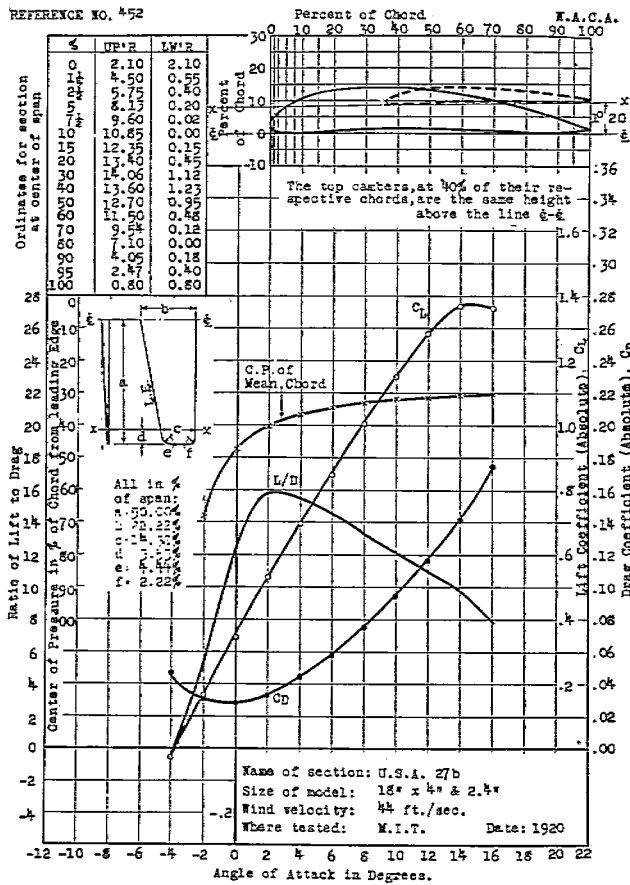




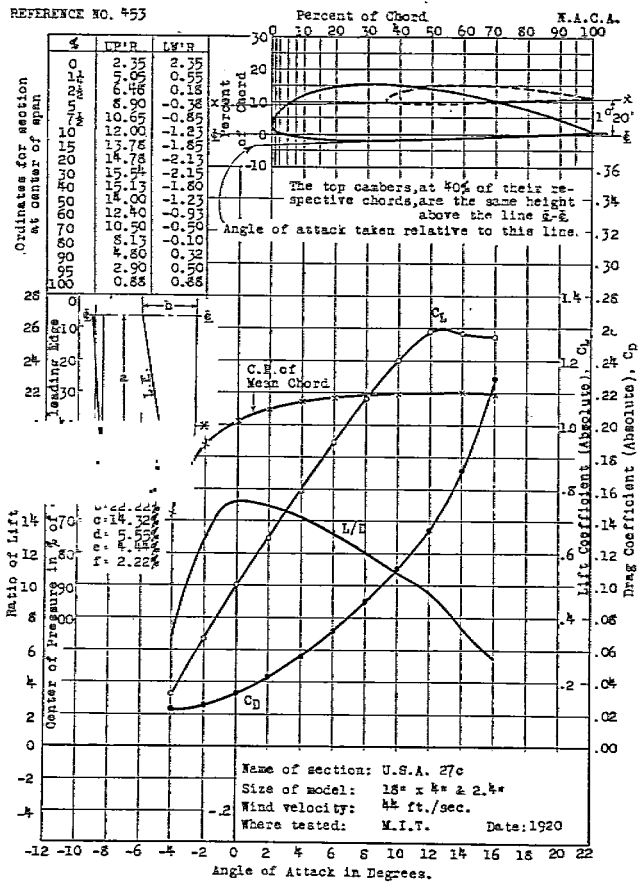




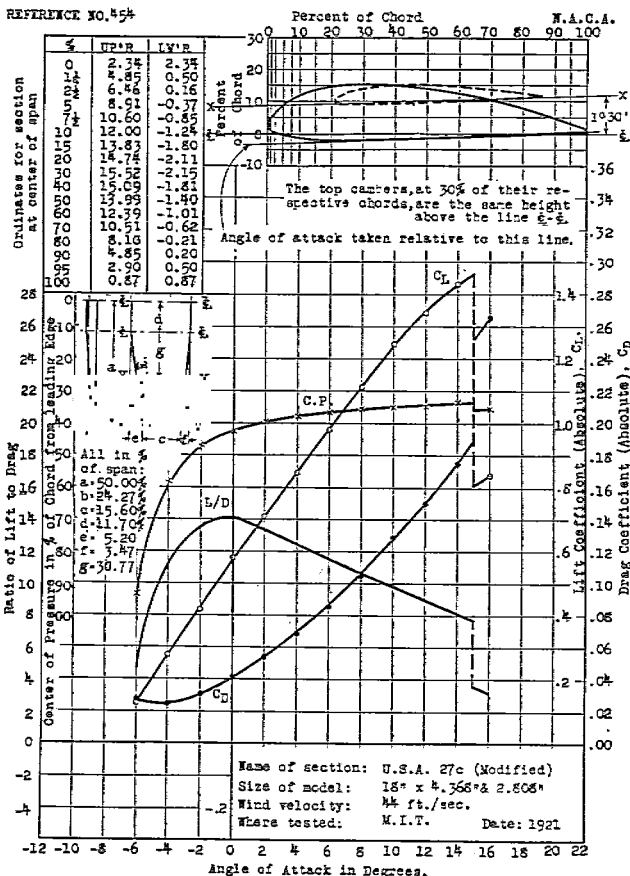
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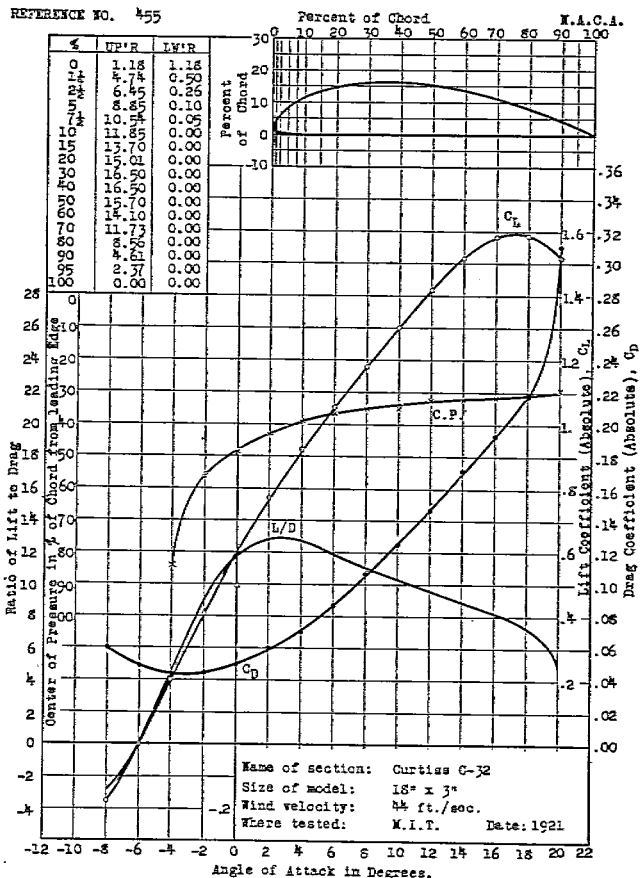
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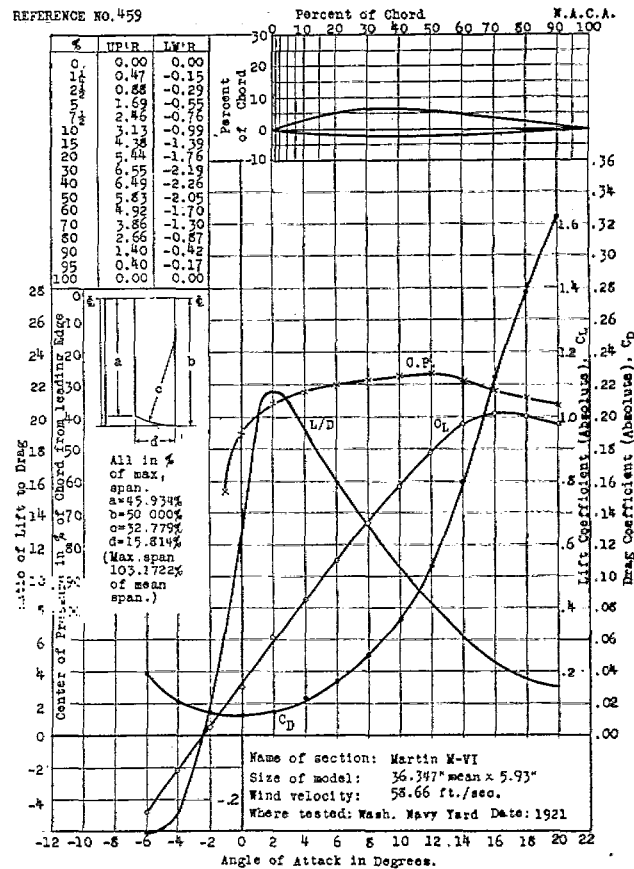
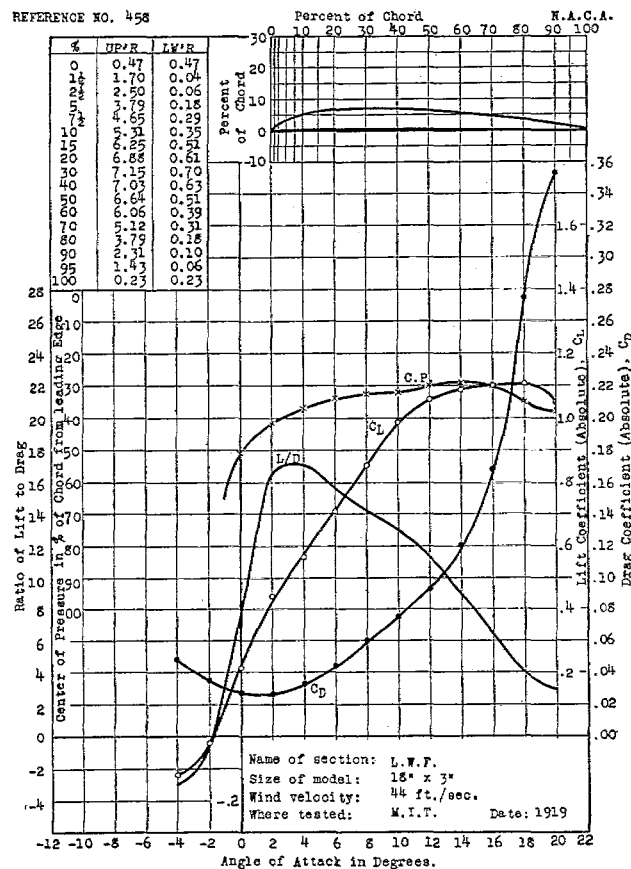
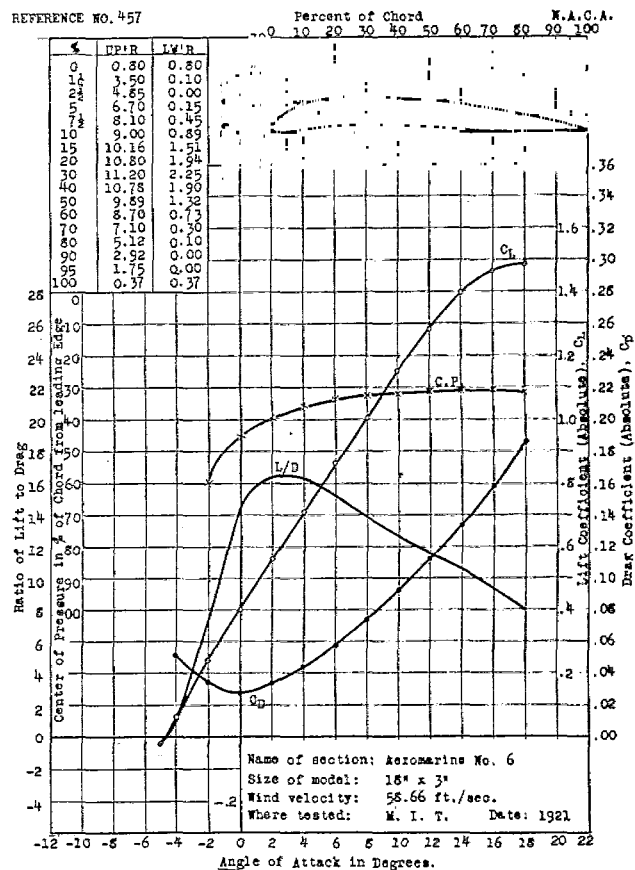
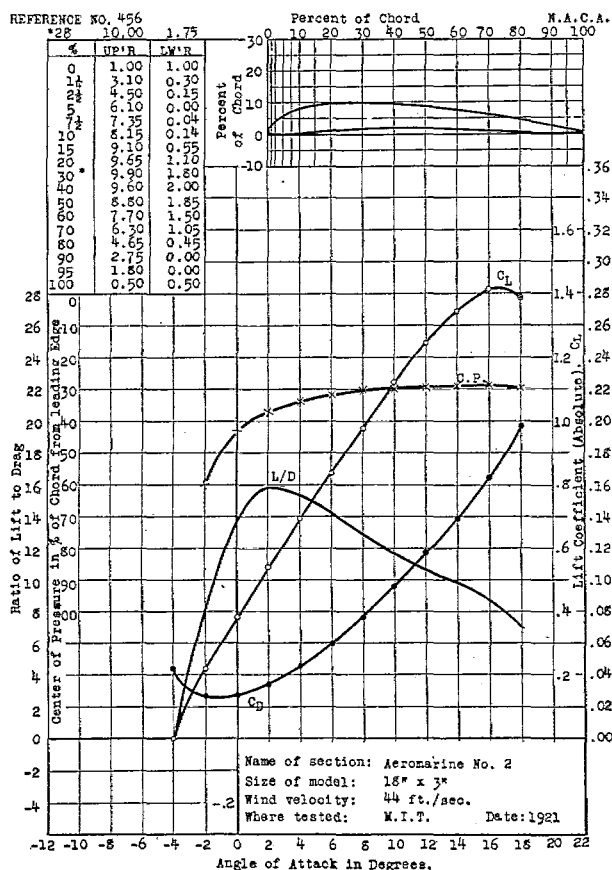


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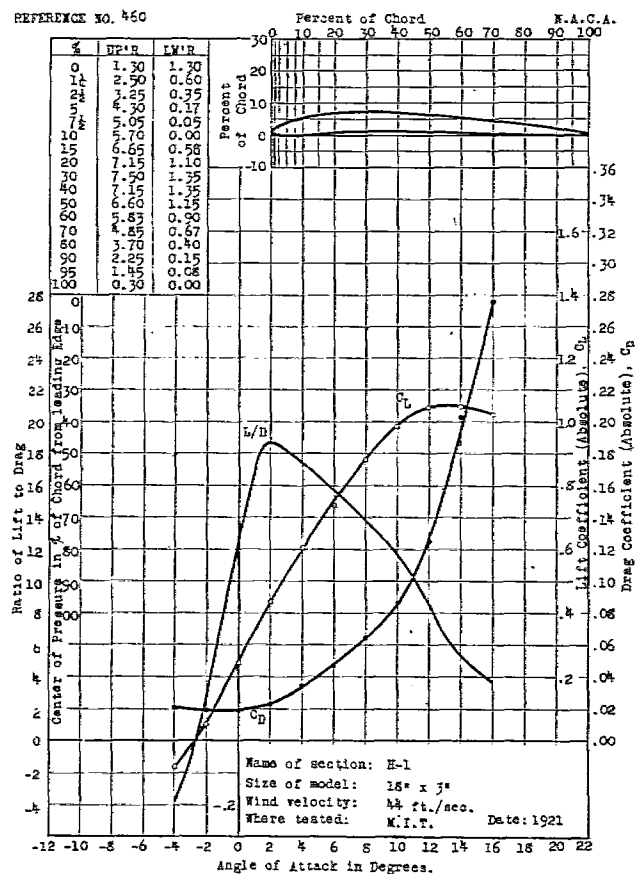


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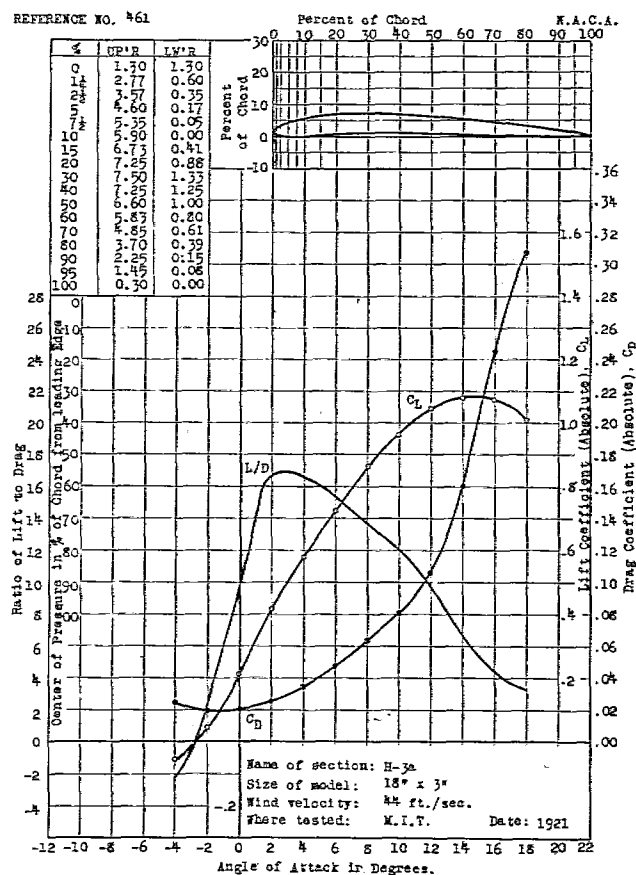




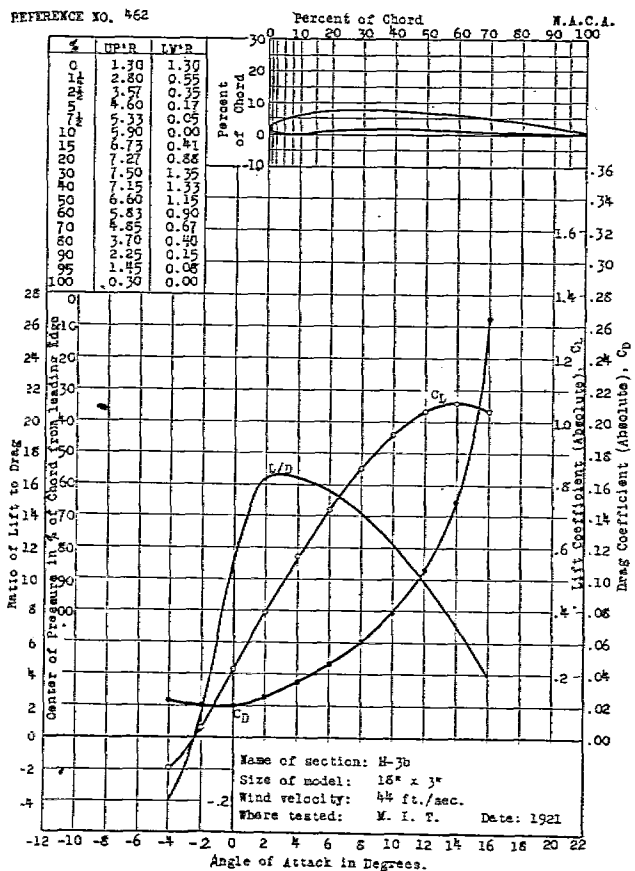
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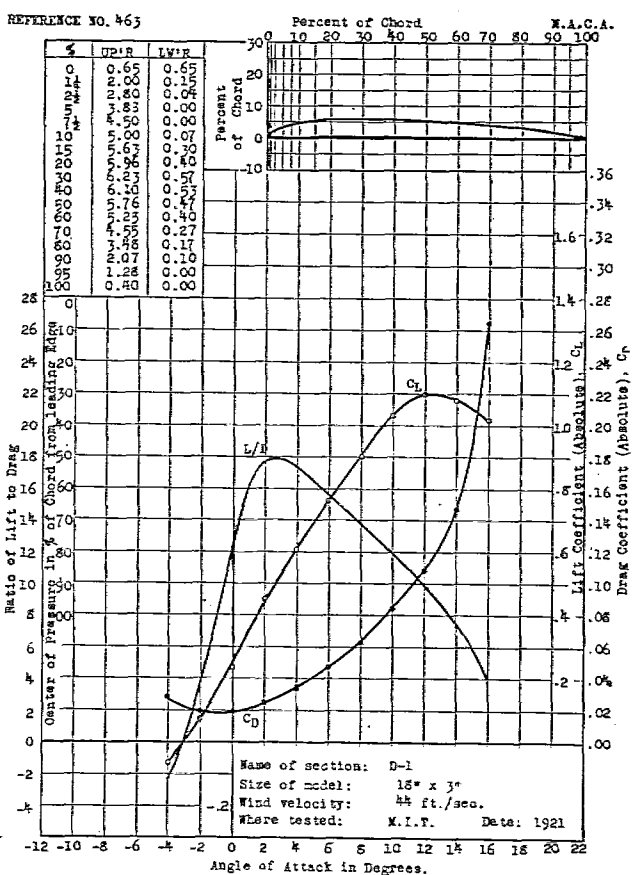
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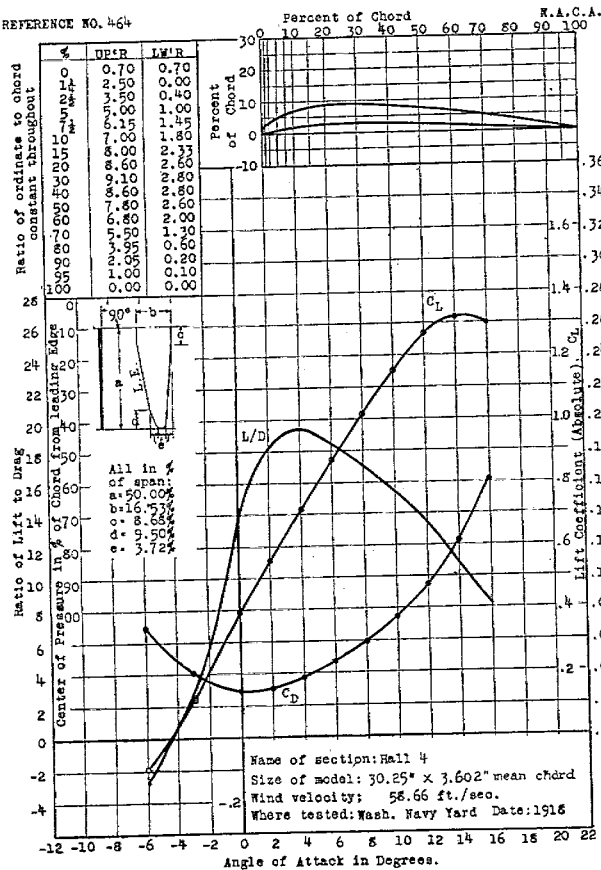
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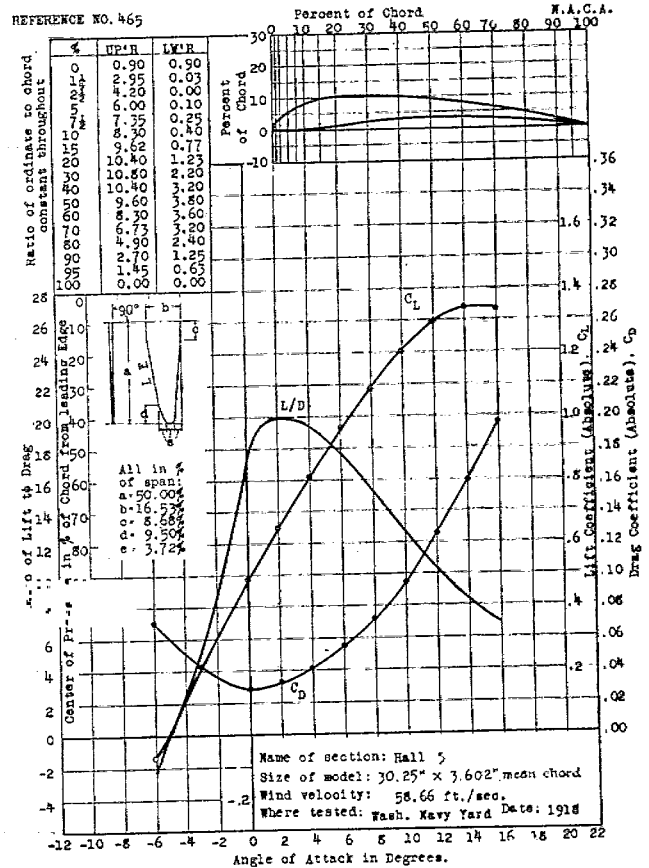
REFERENCE NO. 463



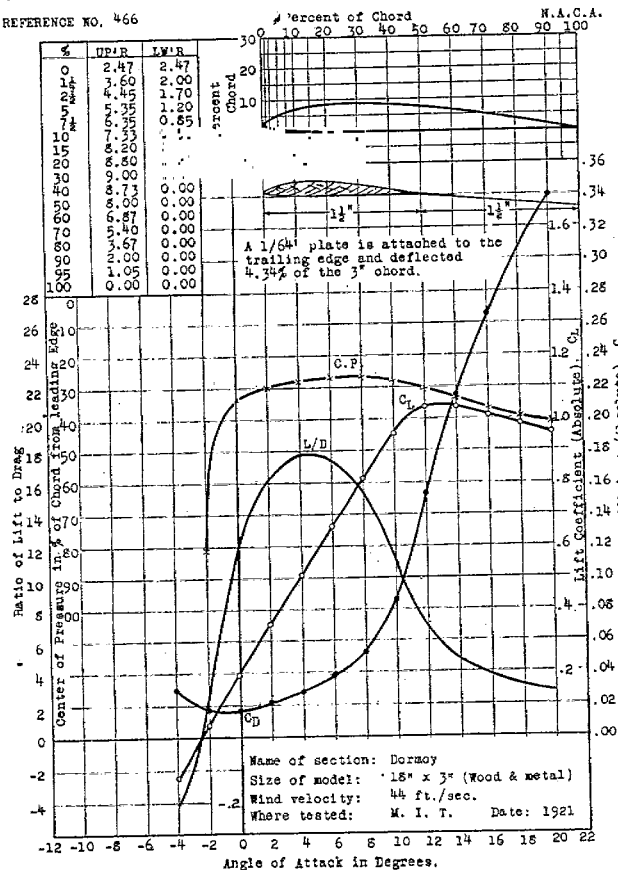
REFERENCE NO. 464



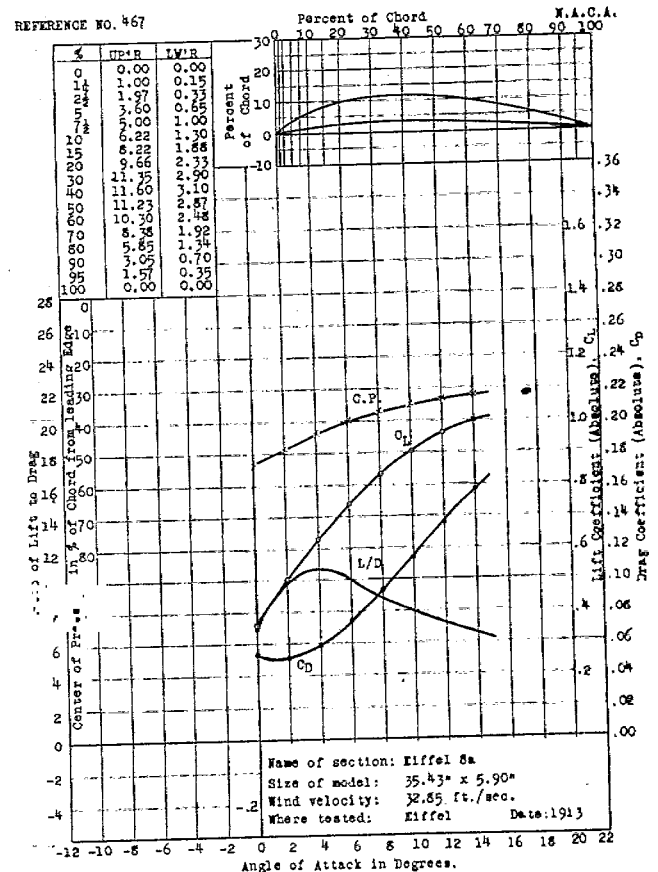
REFERENCE NO. 465



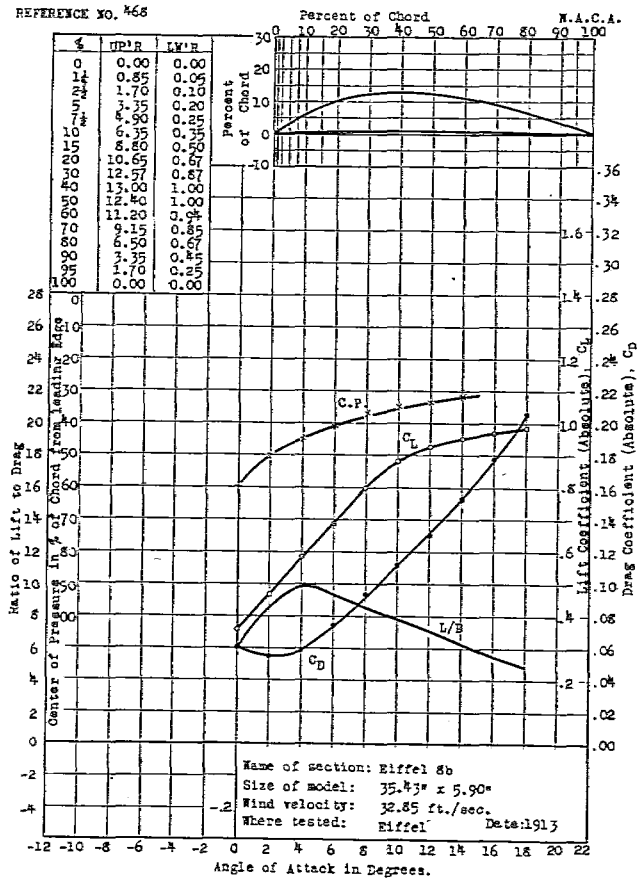
REFERENCE NO. 466



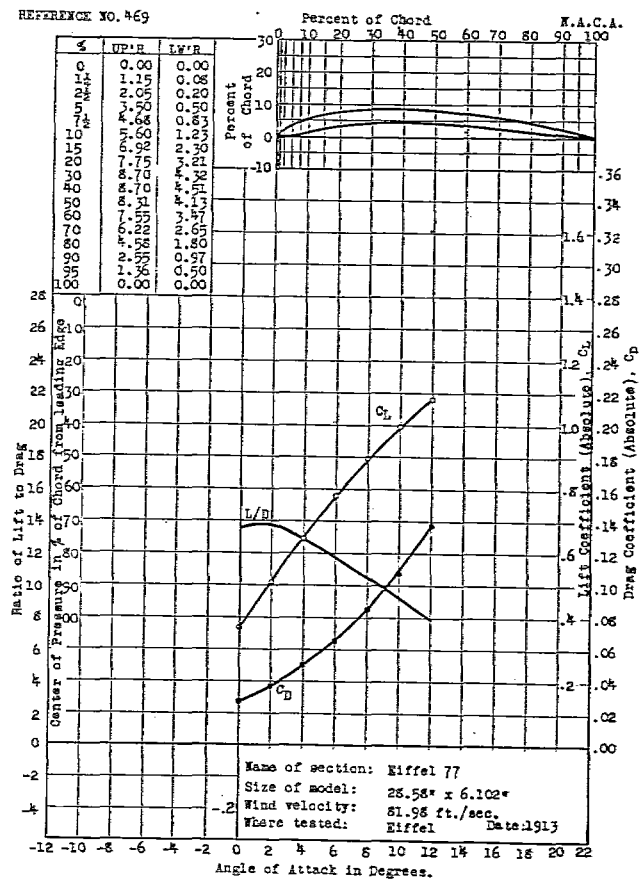
REFERENCE NO. 467



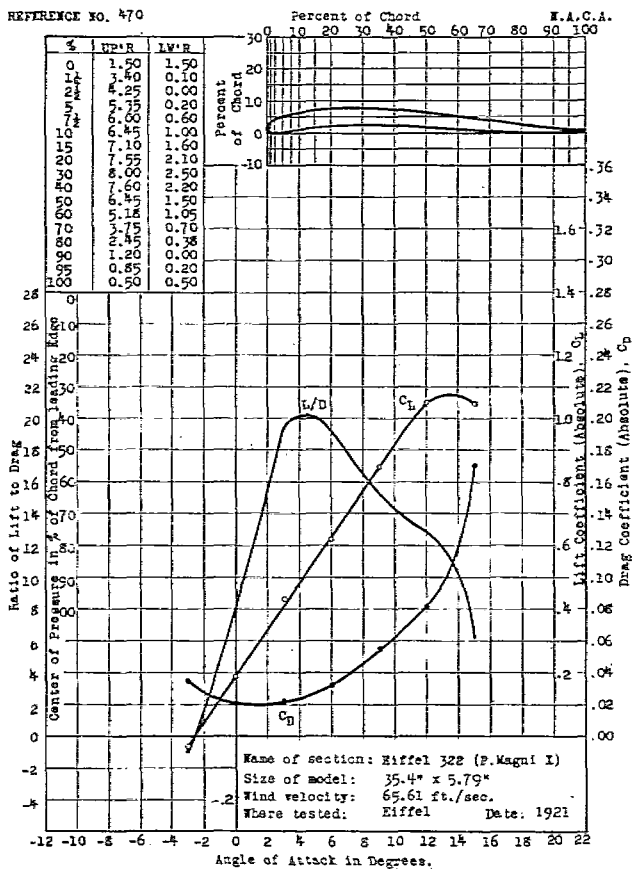
REFERENCE NO. 468



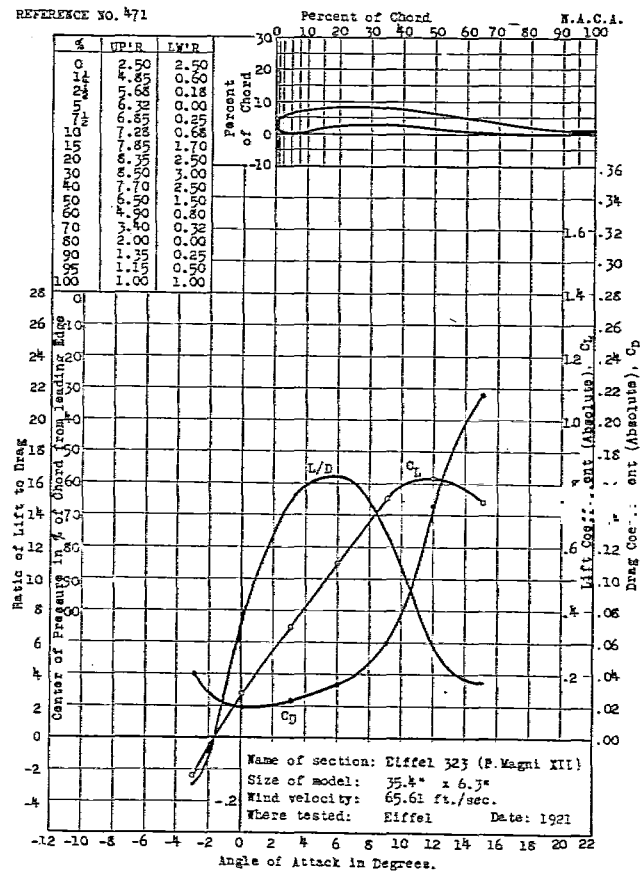
REFERENCE NO. 469

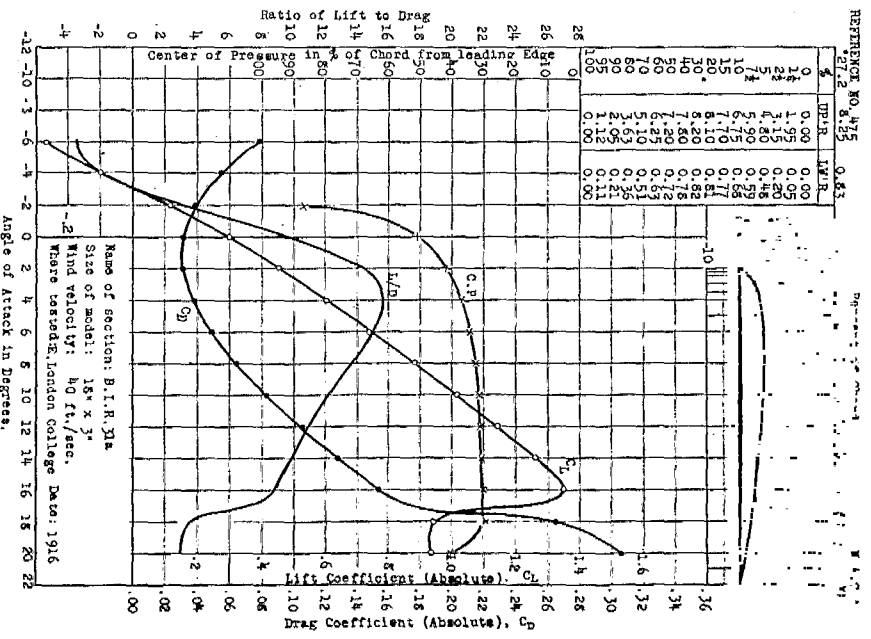
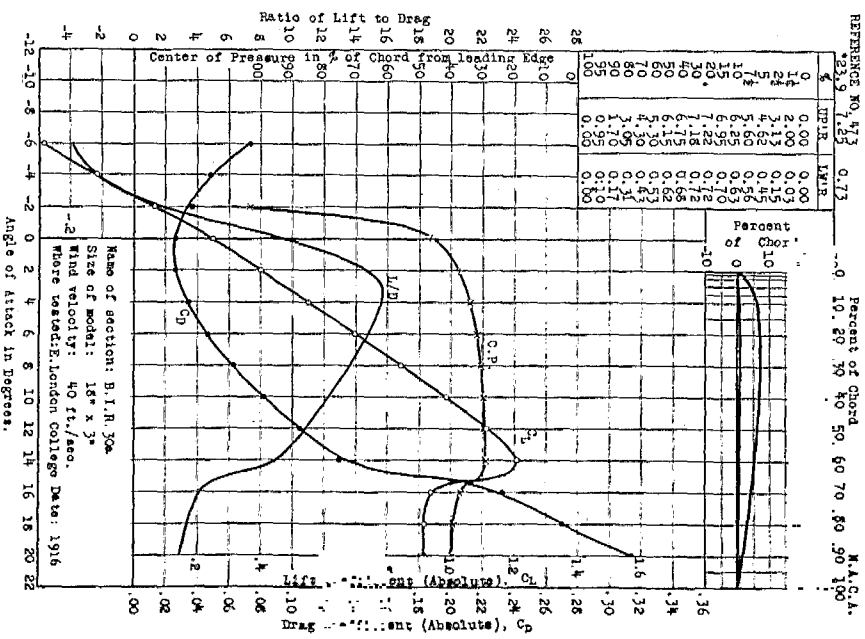


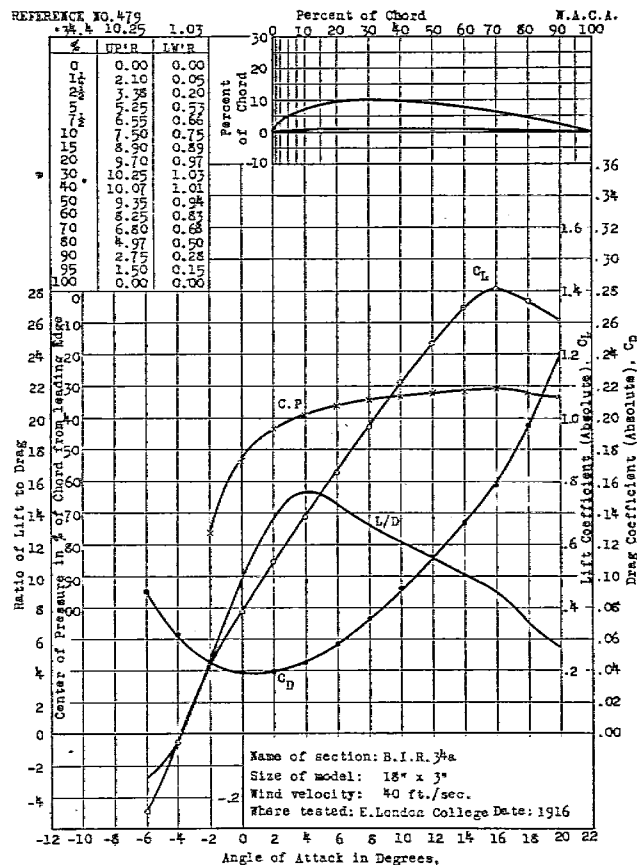
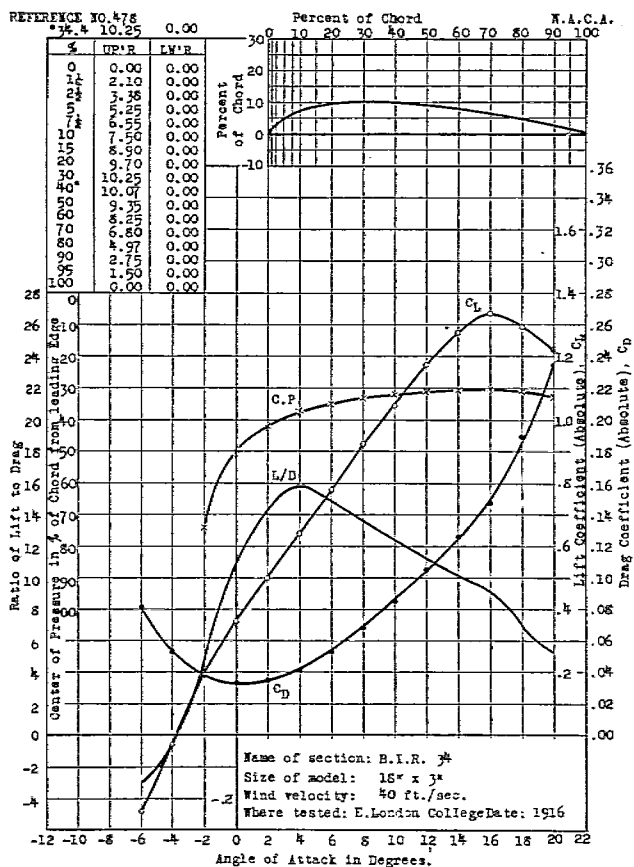
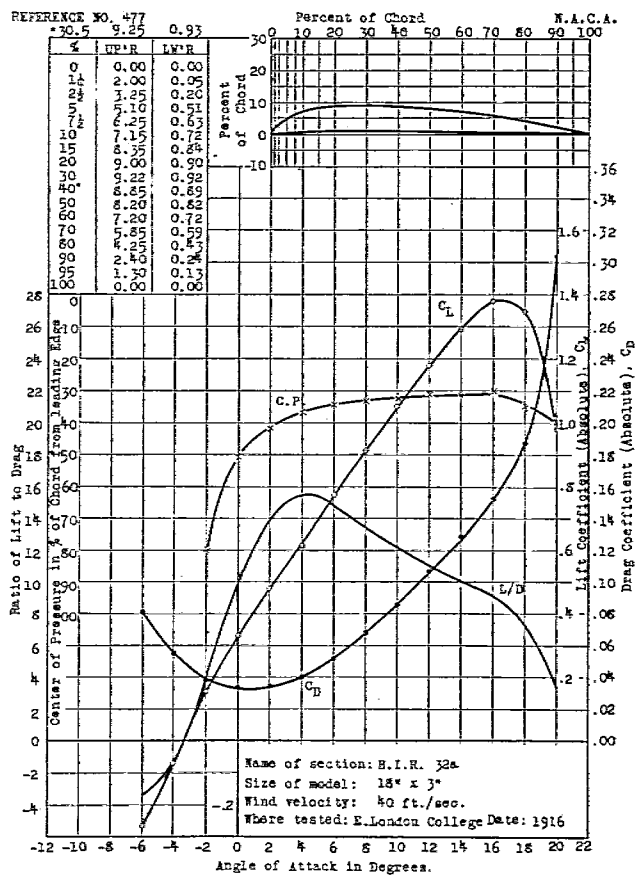
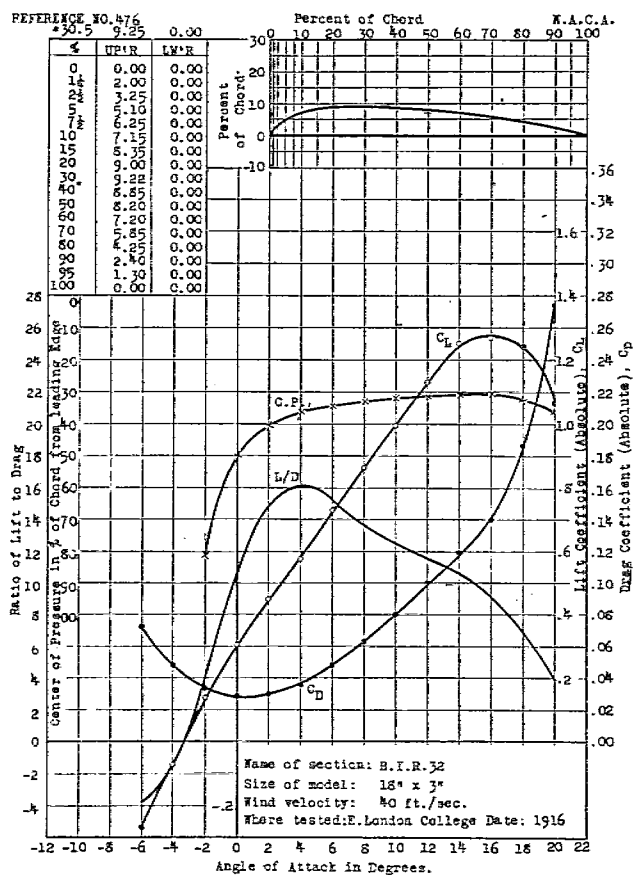
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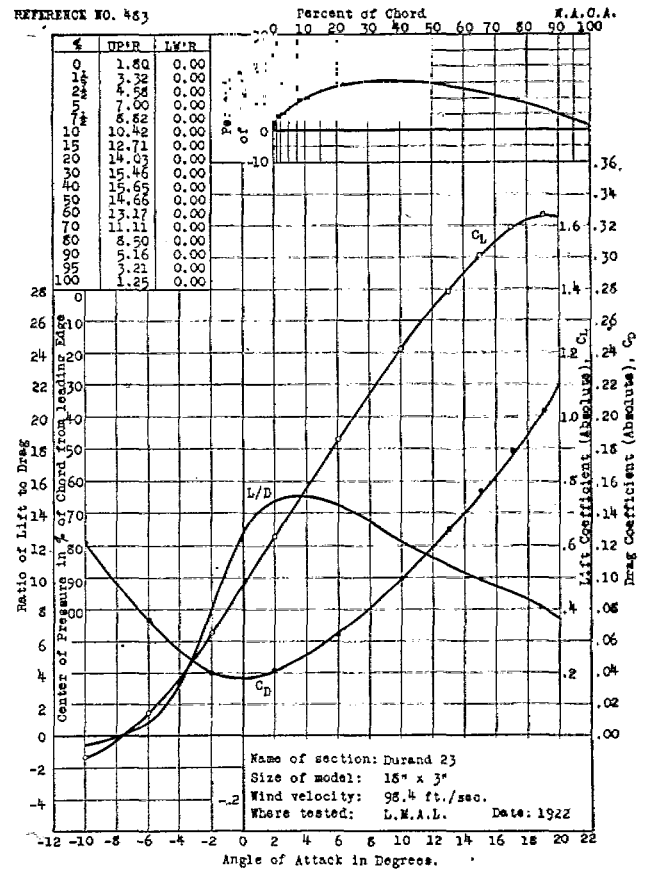
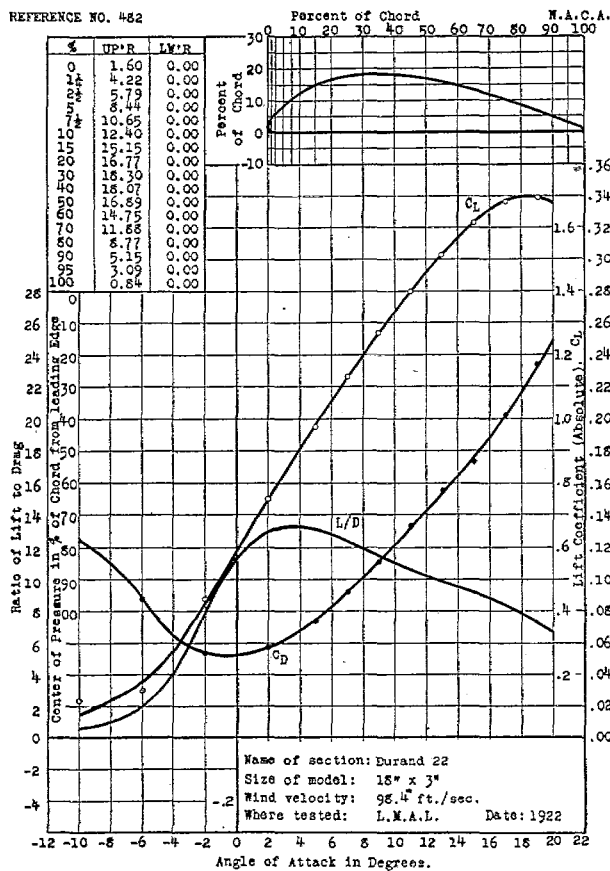
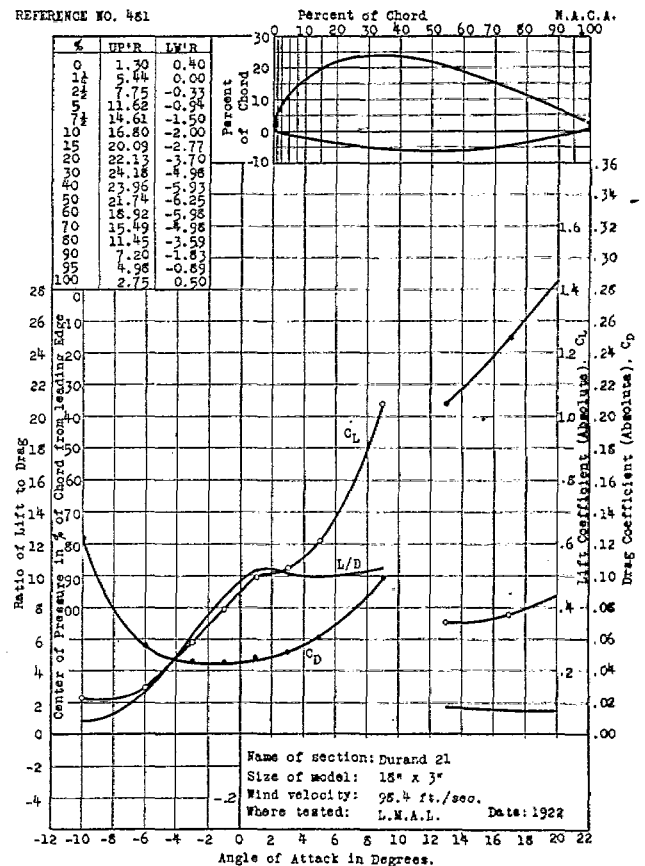
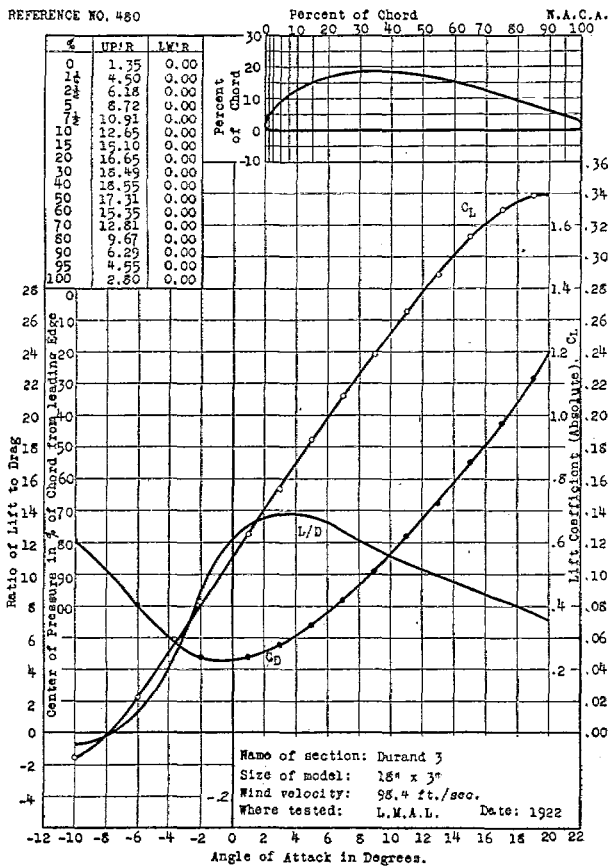


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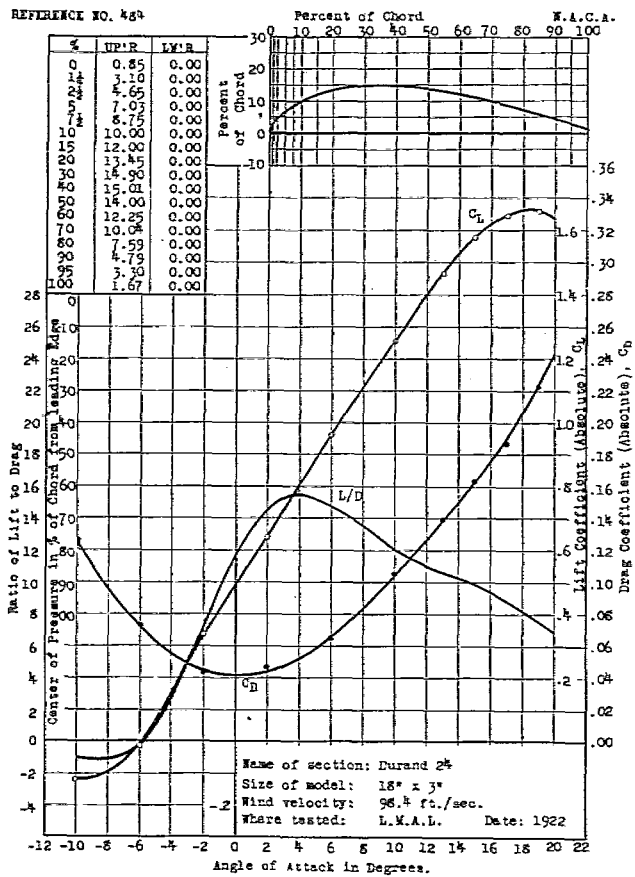




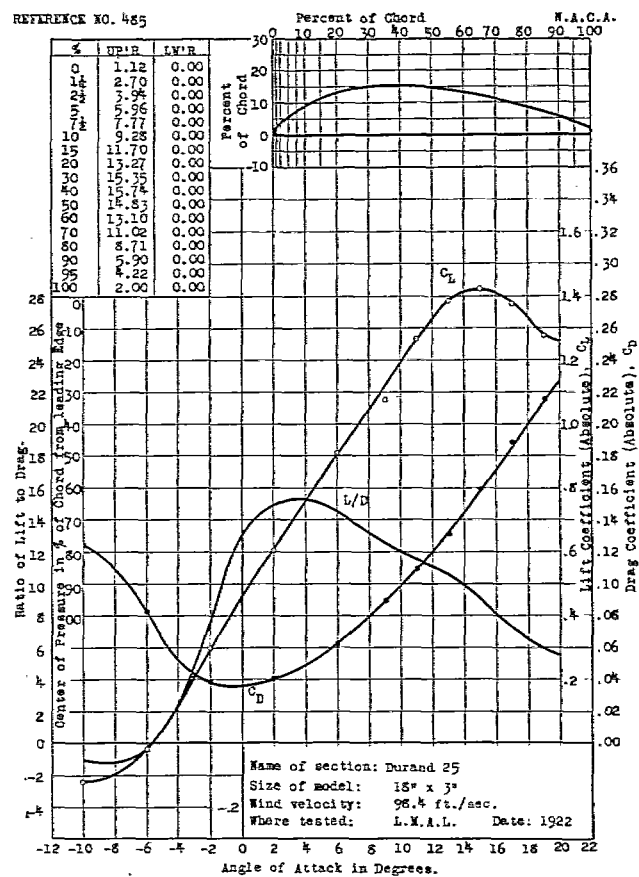




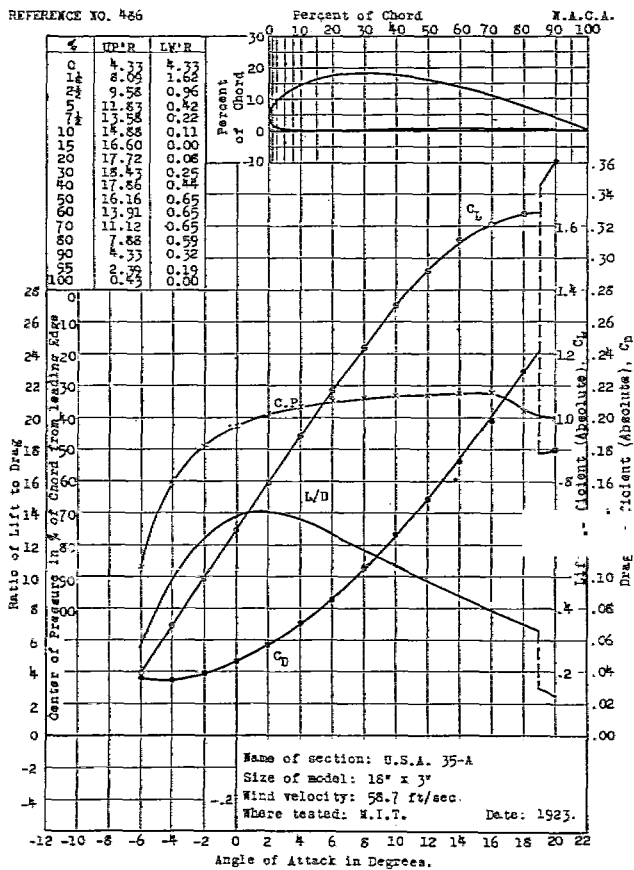
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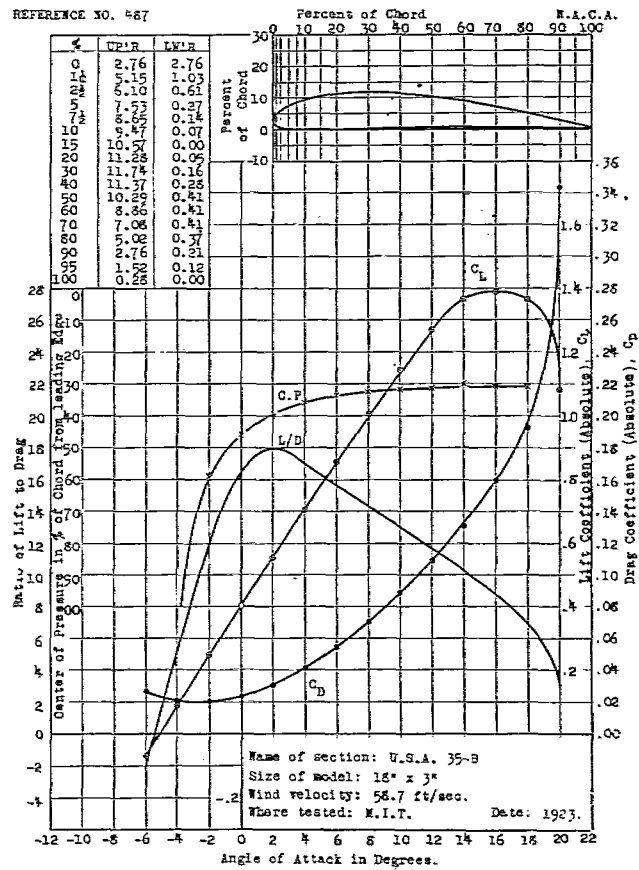
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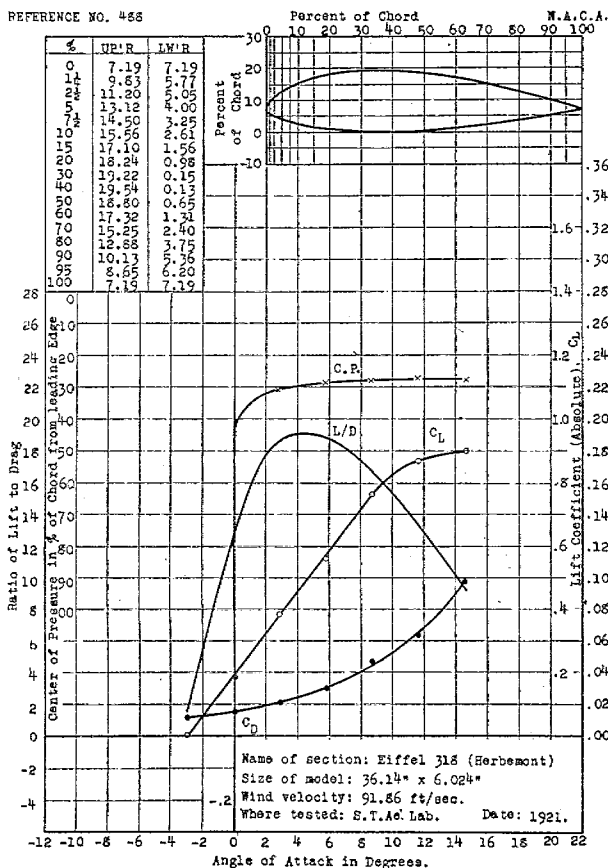
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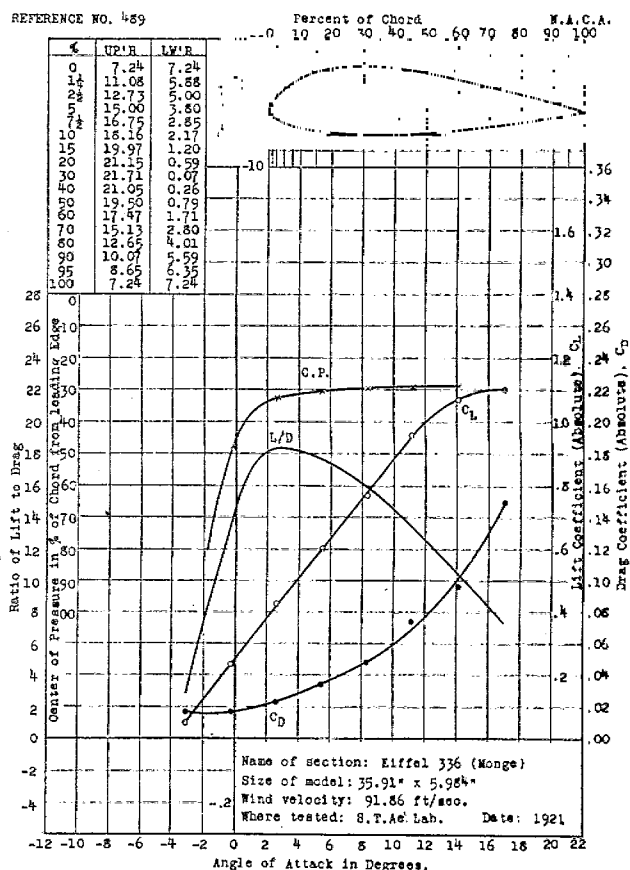
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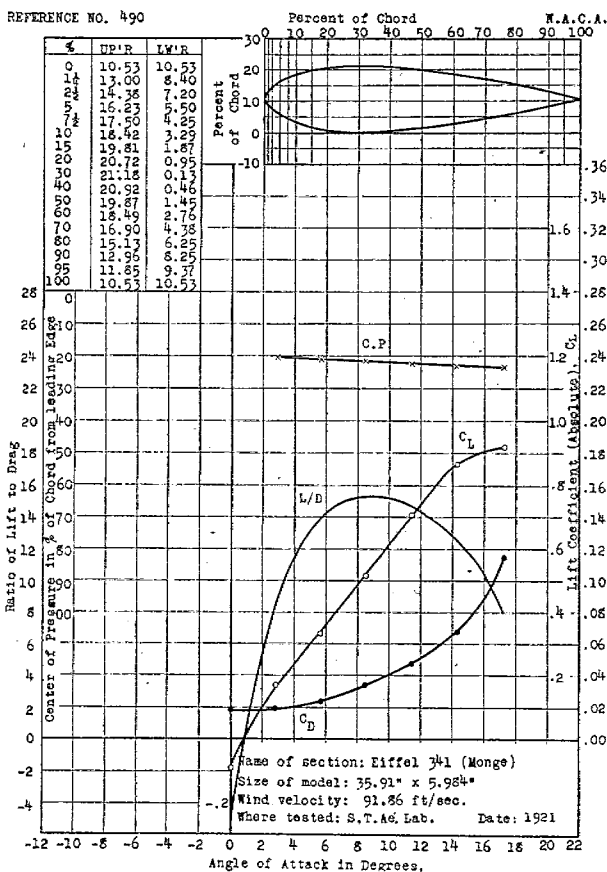
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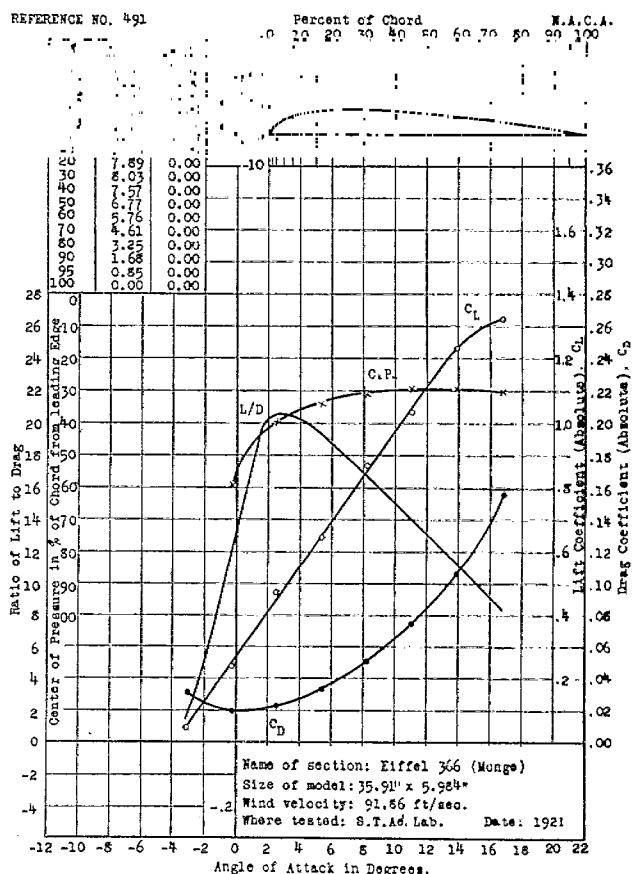
REFERENCE NO. 459



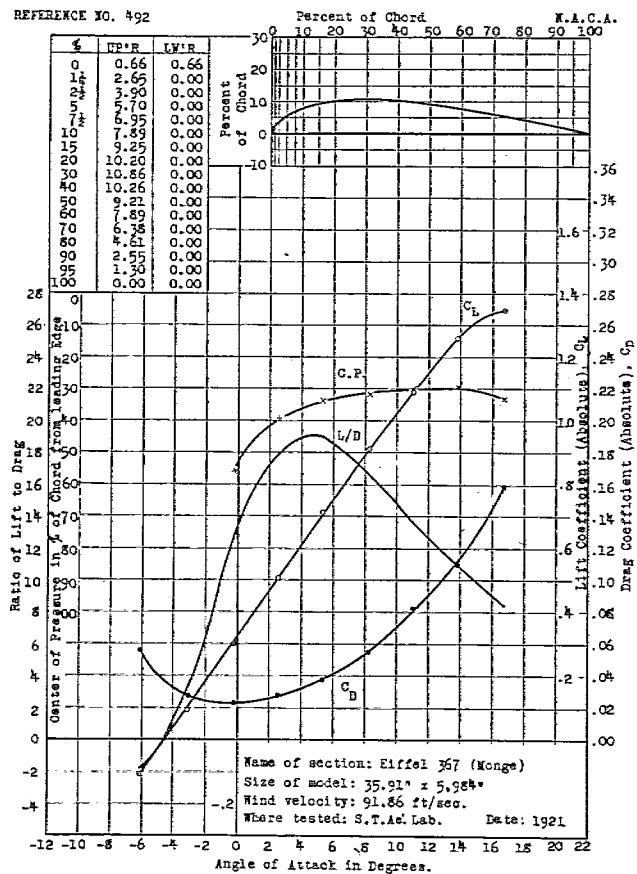
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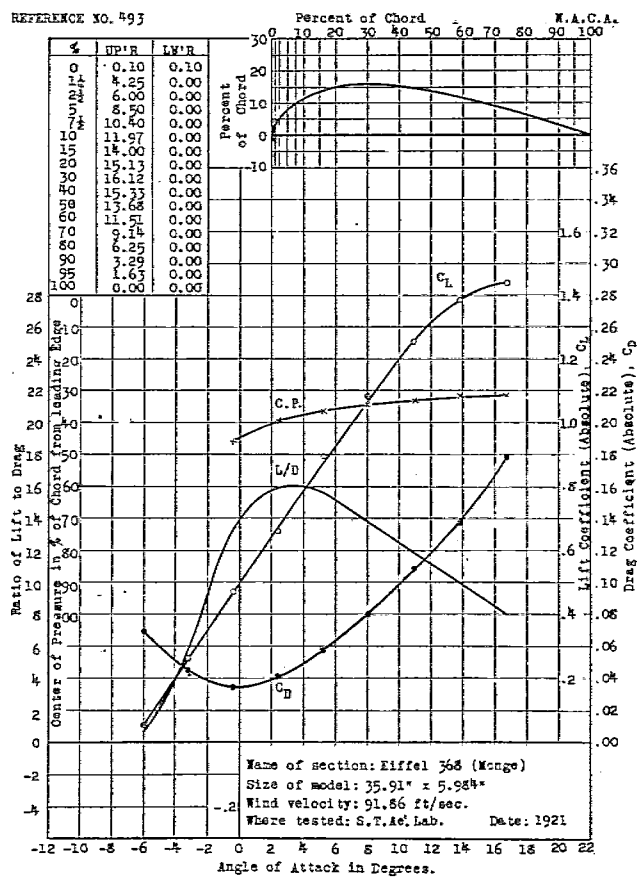
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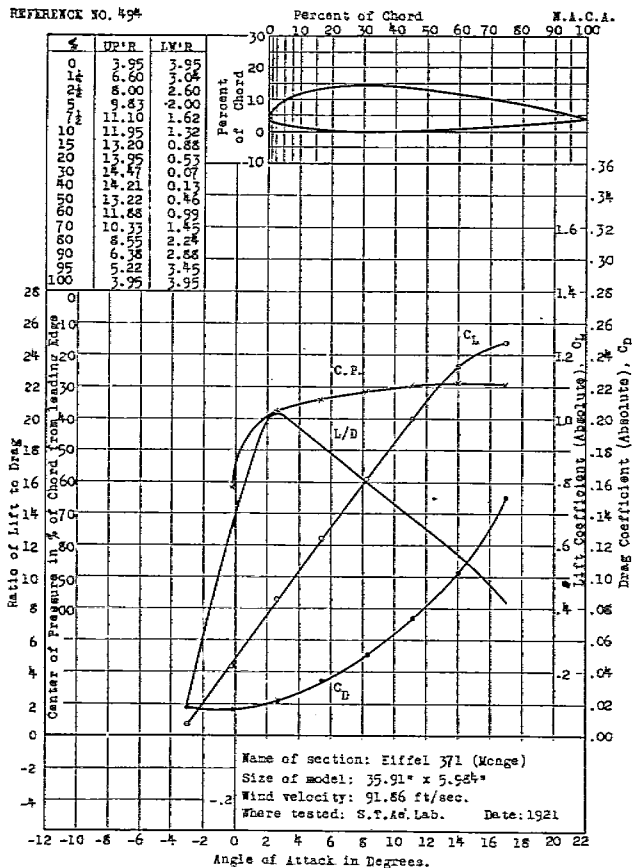
REFERENCE NO. 492



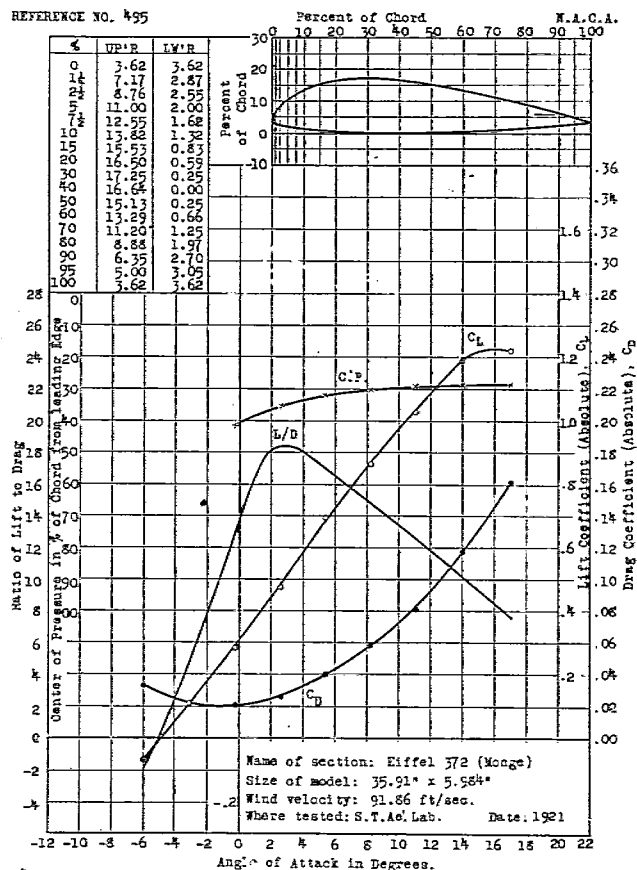
REFERENCE NO. 493



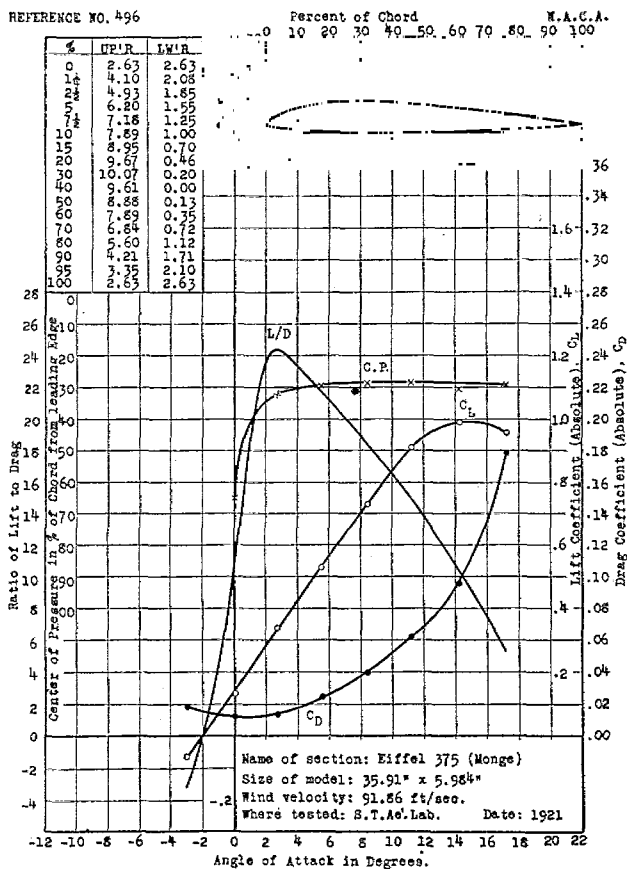
REFERENCE NO. 494



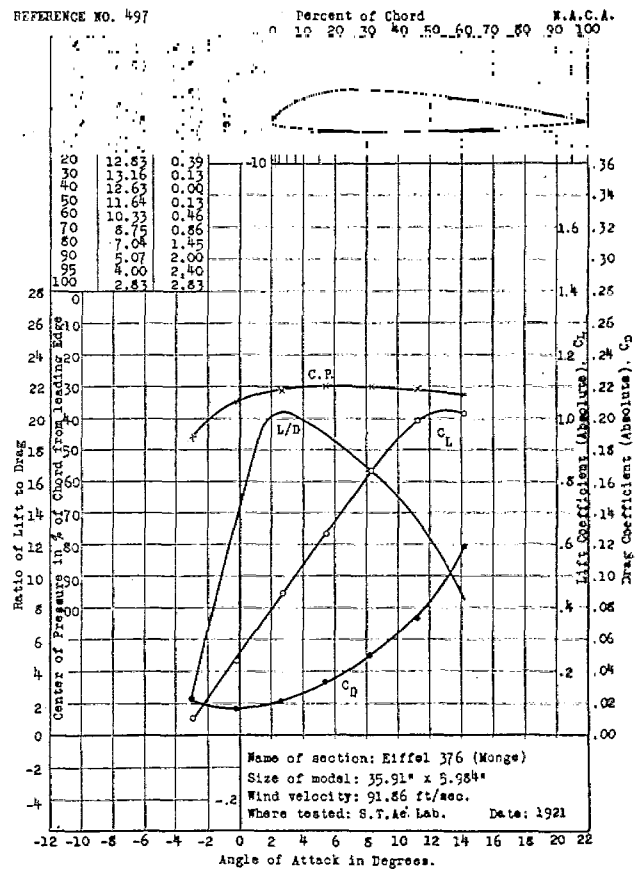
REFERENCE NO. 495



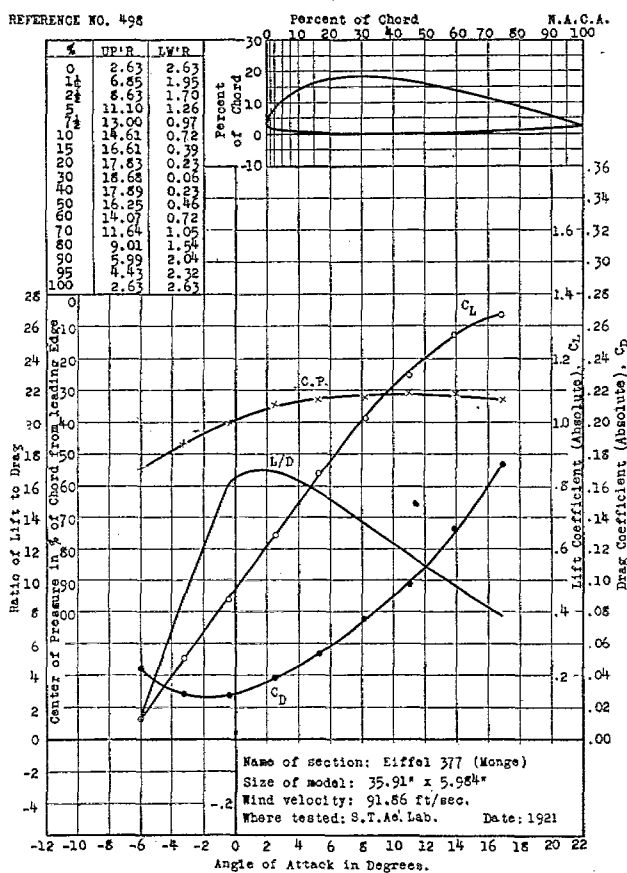
REFERENCE NO. 496



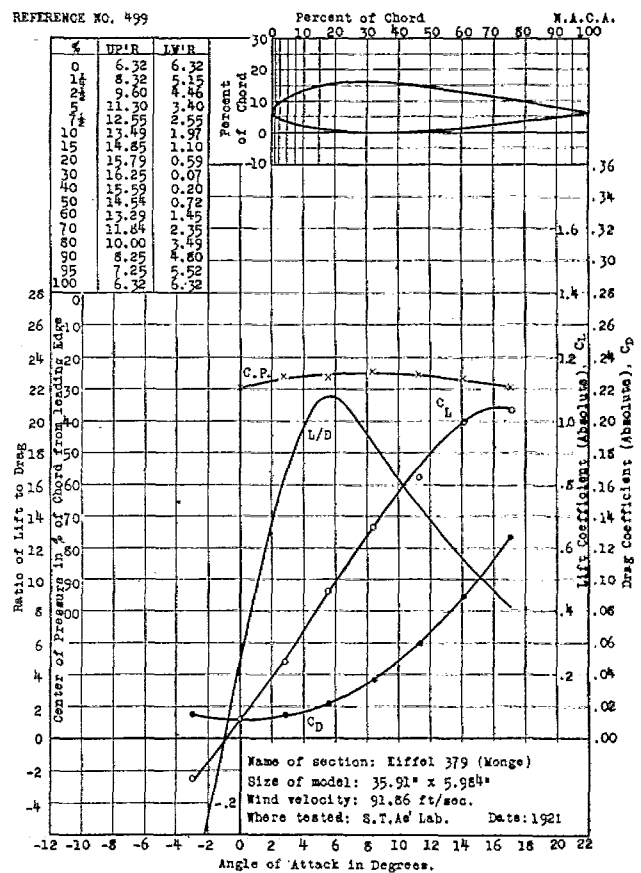
REFERENCE NO. 497



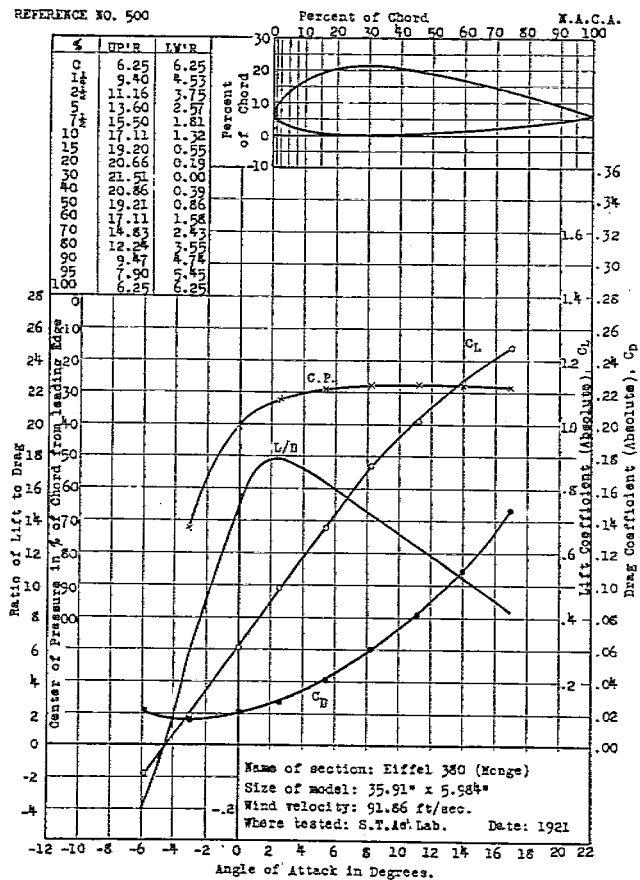
REFERENCE NO. 498



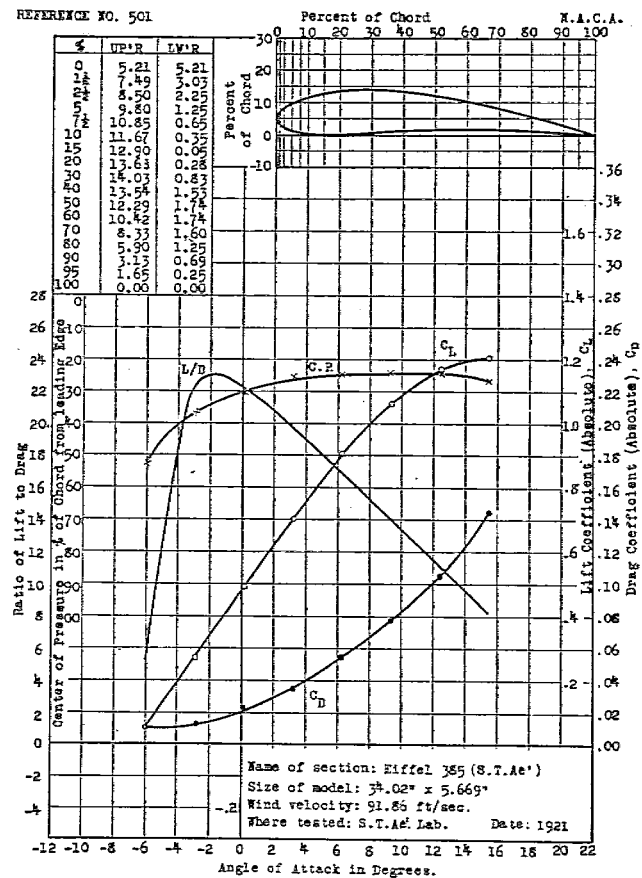
REFERENCE NO. 499



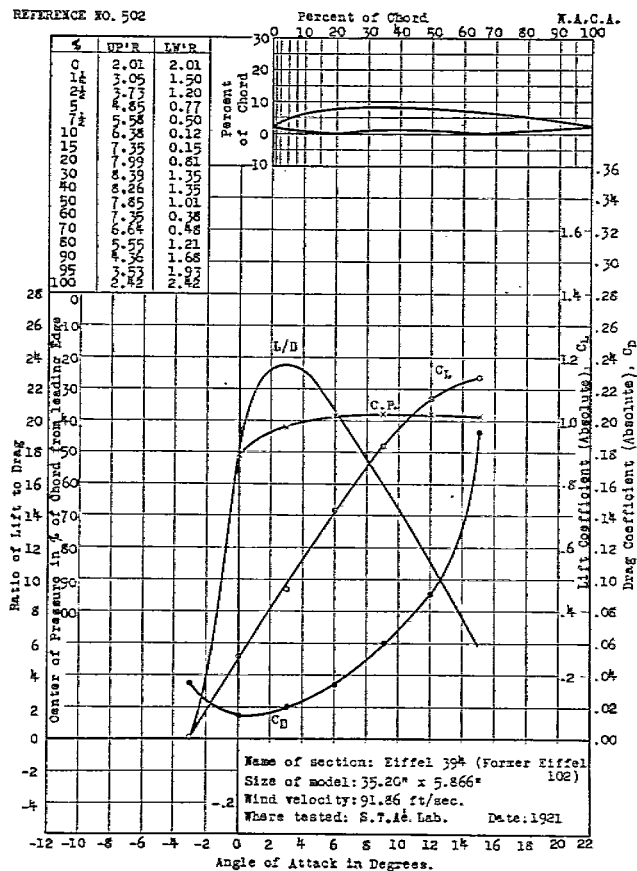
REFERENCE NO. 500



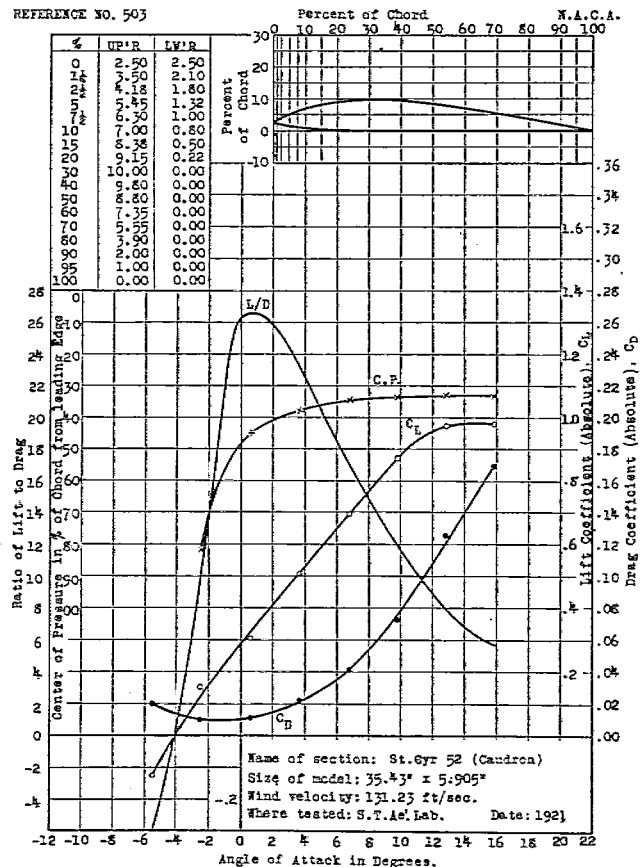
REFERENCE NO. 501



REFERENCE NO. 502



REFERENCE NO. 503



TABLES OF ORDINATES NOT GIVEN ON INDIVIDUAL CHARACTERISTIC SHEETS.

(Airfoils designed by the National Advisory Committee for Aeronautics.)

Ordinates for dotted section at tip where ratio of ordinate to chord differs from that of section at center of span.

Stations, in per cent of chord.	Nos. 54, 55, 56, 57, 58, 73, 79, 81, upper.	Ref. 431, 54.	Ref. 432, 55.	Ref. 433, 56.	Ref. 434, 57.	Ref. 435, 58.	Ref. 446, 73.	Ref. 448, 79.	Ref. 449, 81.
		Lower.	Lower.	Lower.	Lower.	Lower.	Lower.	Lower.	Lower.
0	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
1.25	1.12	0.12	0.10	0.05	-0.10	-0.12	-0.14	0.05	-0.11
2.50	1.44	0.19	0.17	0.00	-0.17	-0.19	-0.22	0.00	-0.22
5	1.95	0.35	0.31	0.00	-0.31	-0.35	-0.42	0.00	-0.42
7.50	2.40	0.58	0.43	0.00	-0.43	-0.48	-0.58	0.00	-0.58
10	2.76	0.62	0.56	0.00	-0.56	-0.62	-0.75	0.00	-0.75
15	3.27	0.86	0.77	0.00	-0.77	-0.86	-1.03	0.00	-1.03
20	3.58	1.05	0.94	0.00	-0.94	-1.05	-1.26	0.00	-1.26
*30	3.93	1.26	1.13	0.00	-1.13	-1.26	-1.51	0.00	-1.51
40	3.93	1.26	1.13	0.00	-1.13	-1.26	-1.51	0.00	-1.51
50	3.71	1.19	1.07	0.00	-1.07	-1.19	-1.43	0.00	-1.43
60	3.28	1.04	0.93	0.00	-0.93	-1.04	-1.25	0.00	-1.25
70	2.73	0.84	0.76	0.00	-0.76	-0.84	-1.01	0.00	-1.01
80	2.10	0.60	0.54	0.00	-0.54	-0.60	-0.72	0.00	-0.72
90	1.37	0.31	0.28	0.00	-0.28	-0.31	-0.38	0.00	-0.38
95	0.99	0.16	0.14	0.00	-0.14	-0.16	-0.19	0.00	-0.19
100	0.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
*33.3	3.97	1.28	1.15	0.00	-1.15	-1.28	-1.54	0.00	-1.54

Ordinates for dotted section at x-x.

Stations, in per cent of chord.	Ref. No. 451, U. S. A. 27a.		Ref. No. 452, U. S. A. 27b.		Ref. No. 453, U. S. A. 27c.		Ref. No. 454, U. S. A. 27e (mod.).	
	Upper.	Lower.	Upper.	Lower.	Upper.	Lower.	Upper.	Lower.
0	1.16	1.16	1.09	1.09	1.16	1.16	1.18	1.18
1.25	2.42	0.20	2.75	0.35	2.40	0.27	2.30	0.35
2.50	3.14	0.19	3.52	0.21	3.19	0.12	3.06	0.11
5	4.30	0.11	4.29	0.10	4.14	-0.17	4.31	-0.14
7.50	5.10	0.04	5.05	0.07	5.10	-0.40	5.05	-0.38
10	5.78	0.00	5.72	0.00	5.78	-0.58	5.70	-0.57
15	6.68	0.06	6.67	0.10	6.65	-0.80	6.55	-0.82
20	7.18	0.27	7.27	0.23	7.18	-0.93	7.09	-0.96
30	7.55	0.61	7.47	0.60	7.56	-0.85	7.51	-0.85
40	7.33	0.66	7.27	0.66	7.33	-0.70	7.30	-0.68
50	6.75	0.51	6.83	0.50	6.75	-0.58	6.70	-0.57
60	6.01	0.27	5.97	0.19	6.01	-0.39	5.98	-0.39
70	5.11	0.07	5.03	0.06	5.12	-0.36	5.09	-0.28
80	3.88	0.00	3.82	0.00	3.88	-0.16	3.81	-0.11
90	2.40	0.15	2.22	0.10	2.20	0.05	2.25	0.05
95	1.55	0.28	1.40	0.23	1.33	0.20	1.40	0.15
100	0.43	0.43	0.39	0.39	0.43	0.43	0.39	0.39

Ordinates for section at y-y.

Stations, in per cent of chord.	Ref. No. 454, U. S. A. 27e (mod.).	
	Upper.	Lower.
0	1.75	1.75
1.25	3.70	0.40
2.50	4.90	0.14
5	6.58	-0.25
7.50	7.88	-0.60
10	8.83	-0.89
15	10.15	-1.24
20	10.92	-1.53
30	11.51	-1.50
40	11.20	-1.25
50	10.34	-1.00
60	9.20	-0.70
70	7.80	-0.44
80	5.94	-0.19
90	3.64	0.15
95	2.36	0.35
100	0.64	0.64

